NATURE MAGAZINE

HIRAM KELLY BRANCH
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TO STIMULATE PUBLIC INTEREST IN NATURE
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JANUARY • 1937

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AN ISHMAEL OF THE OCEAN BEACH

Howard J. Shannon

PREHISTORIC WEATHER

Charles Fitzhugh Talman

THE SABAL PALMETTO

Robert W. McDermid

GUARDING THE COLUMBIA'S SILVER HORDE

Frank T. Bell

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To Stimulate Public Interest in Every Phase of Nature and the Out-Of-Doors, and Devoted to the Practical Conservation of the Great Natural Resources of America

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Old Ski Feet

A moose with elongated hoofs that turn up at the ends has been christened "Old Ski Feet" by Ranger David Condon in a report to the Yellowstone National Park *Nature Notes*. The moose had trouble navigating with her strange pedal extremities, and her walk was necessarily a noisy shuffle. Many reasons for the deformity have been suggested, the most common one being that the animal had spent most of her life in a locality where the hoofs were not worn down by her daily travels. More scientific explanations reason that there must have been some deficiency in certain glandular excretions that control the chitenos portions of the animal's anatomy.

Indian Burial Mounds

Wycliffe, Kentucky, reports Edna Rau in the journal of the Webster Groves Nature Study Society, was a tiny town "where a tired tourist could not buy at any price a good ham sandwich," but now it is famous. The reason is the discovery of Indian burial mounds that have yielded remains, tools, pottery, jewels, flints, instruments and trophies. Nine mounds have been found, close together. Indications are that the Indians were fire worshipers, and Mexican and Central American influence is noted in the pottery. Archaeologists are now at work trying to place these people.

North Dakota Refuges

Refuges for migratory waterfowl and water conservation have been established in fifty-seven North Dakota areas during the past year by the U. S. Biological Survey on more than 90,000 acres of land turned over to the Government through perpetual easements signed by farmers and other land owners. Twenty-five of them have been developed with funds from the Works Progress Administration, and 1800 men are now at work improving the 32 other refuges.

Development of the refuges, in practically every case, involved the building of storage dams, marsh embankments, and other water-impoundment devices that aid in the conservation of water. This impounded water also helps to stabilize the water level in adjoining lands. The farmers of the region helped considerably to advance the program by granting the easements gratuitously. Out of the 93,391 acres obtained for refuge development, it was necessary to buy less than 1500 acres.

Fish and Fighting

Edward Weber Allen is one of the United States commissioners on the International Fisheries Commission. In this capacity he has come intimately in contact with the international problems of controlling and using the fisheries resources on both sides of the Pacific Ocean. There are potentialities of strife involved in these natural resources, and in a book entitled *North Pacific* Mr. Allen discusses them in most interesting fashion. Using a trip along the rim of the North Pacific as a framework, he weaves a significant tapestry of people, politics, conservation, exploitation and other factors. It is a well-written book, entertaining as well as informing. More than these, it is important. It is published by the Professional and Technical Press and sells for $2.50.

Idaho Pioneers

The craftsmen of the Caxton Printers, Ltd., Caldwell, Idaho, have been responsible for the production of numerous books on Americana. Their newest publication, *Letters of Long Ago* by Agnes Just Reid, is the story of the Idaho pioneer days from 1870 to 1890 told in letters of a pioneer wife to her English father. The author, the daughter of the woman who helped blaze the trail to the West, has avoided altering the simplicity and homely phrases of the letters, the result being a book from which we learn that pioneering was less romance and more hard work than some modern writers would have us believe. The discriminating reader who wants to know how a typical pioneer family really lived will find *Letters of Long Ago* an authentic history. The book is available from the publishers for $1.50.

Science Textbook

General Science for Today is an excellent textbook for beginning students written by Ralph K. Watkins, professor of education at the University of Missouri, and Ralph C. Bedell, professor of education at the Missouri State Teachers College. The book is composed of fifteen units, each of which touches on a different phase of science and its relation to our everyday life. Throughout, the authors have attempted to help young students build up better understandings of large ideas in science through their application to familiar things, and the mechanical arrangement of the material is such as to encourage the pupil to read and react in a problem-solving manner. The book, fully illustrated with photographs and line drawings, is available from the Macmillan Company at a list price of $1.72, subject to the usual school discount.

Birds of the Americas

The Catalogue of Birds of the Americas, an immense technical work of interest to ornithologists, is a step nearer completion with the publication by the Field Museum of Natural History of Part IX of the series. Four volumes remain to be published, and when complete, the work will present a list, with ranges and synonymy, of about 10,000 birds, including all species and subspecies known to occur in North, South and Central America, the islands of the Caribbean Sea, the Galapagos Archipelago and certain other islands. First undertaken in 1916 by the late Charles B. Cory, the work has been continued by Dr. Charles E. Hollmayr, associate curator of birds of the Museum.

Radio Fire-Fighters

For the first time in Forest Service fire-fighting history an observer scouting a forest fire from an airplane has communicated directly with the fire boss on the ground and assisted in concentration of fire-fighters where the need was greatest. This, the Forest Service reports, was accomplished at the Kelly Forks fire in the Clearwater National Forest of northern Idaho when successful tests were made with new short-wave sending and receiving apparatus developed by Forest Service engineers. The development of airplane-ground communication adaptable to use in forest-fire control work, the forest officers say, will result in more effective use of protective forces and better coordination of fire control action all around.

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Photographic Notes

BY SAMUEL BROWN

Enlarging

While winter presents a host of photographic subjects, there are those days that are not conducive to outdoor camera work. Perhaps a storm or unusually cold weather demands that we stay indoors. At these times there are so many things that one can accomplish in the darkroom that days and evenings spent thus prove entirely profitable. One of the most fascinating darkroom activities is enlarging. In the camera the negative is made but it is with the enlarger that the picture is made. Reference is very often made to the fact that a picture is *taken*. Except in rare instances, this is untrue. Salon exhibitors always refer to their pictures as having been *made* and at least sixty percent of the work is accomplished with the enlarger. Essentially the procedure for making an enlargement is directly opposite to that of making a negative. In the latter the image of the subject is projected on the sensitive film; in the former the light is projected through the negative and focused on a piece of sensitive paper.

Enlarging is not difficult. On the contrary, it is simple—almost as much so as contact printing. There are, however, a number of controls that are possible, such as dodging, flashing, local printing, vignetting and many more. Each of these requires considerable skill, the achieving of which may not appear worth the effort. However, one good picture, the result of an entire evening's work, is sufficient to repay the photographer in the satisfaction and pleasure that is derived from looking at good pictures that last indefinitely.

Few materials are necessary for making enlargements. An enlarger, of course, is essential, whether it be a standard machine or one made at home. Three trays, developer, acid fixer, a supply of bromide or chlorobromide paper and cold running water complete the necessities.

After preparing the solutions in the correct proportions and inserting the proper safelight slide into the lamp, the first step toward making an enlargement is to place the negative in the negative carrier and focus the image sharply on the easel. The light is turned out and a sheet of enlarging paper is cut into strips. With the red filter over the lens, one strip of paper is placed on the easel where the most important part of the negative is projected. A piece of cardboard is held over three-quarters of the paper so that it will not be affected by the light. The red filter is removed and an exposure of half the time judged to be correct given. The cardboard is then moved down so that half the paper is exposed and the same exposure formerly given is repeated. This is followed next by exposing three-quarters of the paper and lastly by exposing the whole sheet. Assuming each exposure to have been five seconds, the first quarter has received twenty seconds, the second fifteen, the third ten and the fourth five. The strip of paper is then slipped into the developer and left there for the required time—two minutes in most cases. It is then placed in the rinse bath for a few moments and then removed to the acid fixing bath. After the paper has been in the last mentioned solution for two or three minutes, the white light may be turned on, first making sure that all sensitive material has been carefully covered. By examining the test strip, the proper exposure is ascertained and a whole sheet of paper placed in the easel is exposed, developed, rinsed and fixed. The resulting picture is known as a straight enlargement because no control has been exercised.

"MIRIAM," A VIGNETTED ENLARGEMENT SHOWING THE IMPROVEMENT POSSIBLE WITH A SIMPLE CONTROL DURING EXPOSURE IN ENLARGING. BELOW IS THE STRAIGHT CONTACT PRINT FROM WHICH THE PORTRAIT WAS MADE

One of the most beautiful effects possible in enlarging is vignetting. This is especially adapted to portraits and is easily accomplished. The first step is to place the negative in the enlarger and focus the image sharply on the easel. A large sheet of cardboard is then placed on the easel and a rough sketch of the image is drawn in the center. This is then roughly torn out. A piece of sensitive paper is placed in the easel, and, with the red filter on the lens, is centered properly. The torn cardboard is then held between the lens and paper so that the image is projected through the hole and the exposure made with the red filter removed. Note that only the central portion of the

paper will be affected and the surrounding parts will remain white after development. During the exposure it is necessary to keep the cardboard constantly in motion so that there will not be a definite line beween the exposed and unexposed parts.

Another advantage in making enlargements is that it is easy to mask off the uninteresting parts of the negative and thus enhance the composition considerably.

In the foregoing we have given the simplest elements in enlarging. There is considerably more than can hardly be revealed in one article. If sufficient requests are received, this department will devote space to

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Films

Panchromatic films for amateur use are divided into two separate and distinct groups. The first is made essentially for speed and the second primarily for fine grain. Both groups possess all of the characteristics of a panchromatic emulsion, outstanding of which is its sensitivity to every one of the colors occurring in the spectrum including red. While orthochromatic film has lengthened the picture taking day to include the early morning and late afternoon hours, panchromatic emulsions have made it possible to bring the camera indoors and make *snapshots* under artificial light! Brightly lit streets may be photographed with comparatively short exposures and even true moonlight pictures can be made in a reasonably short time.

Films such as *Finopan* and *Panatomic* are made especially to give fine grain negatives and are used extensively in miniature photography. When these emulsions are developed in fine grain solutions such as borax or paraphenylene-diamine developers, the enlargements that may be made are almost limitless. Fine grain panchromatic films are of sufficient speed for all normal purposes being rated in the Scheiner system at 20 degrees in daylight and 17 degrees in Mazda light. When used with a Weston meter, a factor of 16 is allowed with light of daylight quality and 12 under Mazda light.

Under poor lighting conditions, particularly in artificial light where short exposures are necessary, in candid camera work or any place where speed is the most important factor, there are a number of high speed emulsions available. Outstanding in this group are *Super-Sensitive Panchromatic, Superpan* and *Super-X* films. The first two have a Scheiner rating of 23 in daylight and 20 under artificial light. Weston factors are 24 and 16 respectively. The last mentioned are Scheiner, 26 and 23; Weston, 32 and 24.

All panchromatic films are protected against halation by a coating on the back. This is generally green but in some cases merely a neutral grey. This colored backing absorbs all the actinic light that travels through the sensitive surface and prevents it from spreading. These films are also double coated for greatest latitude and to eliminate the danger of either over- or under-exposure.

Since panchromatic films are so highly corrected for color, a pleasant rendition of any subject is possible without the use of a filter. Its greatest advantage lies in its sensitivity to red. Formerly, on non-panchromatic films, this color was always rendered as black giving an unnatural appearance to orange, pink or red flowers. The sensitivity to blue has been decreased somewhat and it is possible to take "sky" pictures having a distinct tone; even cloud pictures are possible without the use of a filter.

From the above discussion it might appear that panchromatic film is the only film that should be used under every condition. However, this is neither desirable nor necessary. A good orthochromatic film will be found suitable for almost all purposes where speed, full color correction and fine grain are not prime requisites. Where these are important, however, then panchromatic films will always give best results.

out of doors

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Trade Hints and New Books

A small 34-page manual on the art of enlarging is available from this department without charge. It describes in detail various machines available for this work and gives practical directions for making enlargements. The booklet tells what paper to use, how to expose it, how to exercise local control and how to give special effects. Many excellent formulas and hints on how to mount, emboss, tone and color the finished picture are given. If you make enlargements you will want this book. Write to this department asking for *Large Pictures from Small Cameras* and enclose a stamped, self-addressed envelope, plus a two-cent stamp.

One of this year's outstanding photographic books is the annual *U.S. Camera*. This writer was attracted by one picture in particular—the only color photograph ever made in the stratosphere. Exceptionally fine delineation is shown by a portion of the American flag which was caught in the picture. No filter was used and the photograph was made on amateur color film with a National Graflex Series II Camera by Major Albert W. Stevens of the U. S. Army Corps.

From the Agfa Ansco Corp., Binghamton, N. Y., comes long-awaited news. *Finopan* film is now available to amateurs who use vest pocket and 2¼" x 3¼" roll film cameras in addition to those using 35 mm. film. This is particularly interesting in view of the fact that despite its speed and color sensitivity, it yields negatives with unusually fine grain. You will want to try *Finopan*.

Mr. Willard D. Morgan, co-author of the *Leica Manual* and formerly head of the photographic department of E. Leitz, is now with the new *Life* magazine in charge of purchasing pictures for publication in that magazine. A letter from Mr. Morgan, addressed to this department, informs us that *Life* will use pictures by the thousands and most of these will be supplied by amateurs from every part of the country. Mr. Morgan further advises us that any amateur interested in contributing pictures should communicate with him giving full details as to types of pictures, and equipment available, subjects in which you are most interested and any other pertinent information so that the proper classification may be made. Mr. Morgan has promised a personal reply to every letter received and he should be addressed, Mr. Willard D. Morgan, %Life Magazine, 135 E. 42 St., New York, N. Y.

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Cordially,
SAMUEL BROWN

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Forestry Education Increases

Mississippi students have bought nearly 14,000 copies of the text book *Southern Forest Study*, prepared by the State Forestry Commission. Assuming that at least two students read each book, some 28,000 young people in Mississippi have a better appreciation and knowledge of forestry than before.

●

Meet Our Authors

Howard J. Shannon, of Jamaica, N. Y., has written extensively in the field of Nature and natural science, his newest work being *A Book of the Seashore,* published by Doubleday, Doran and Company.

Prehistoric Weather is a posthumous article by one of the United States' leading authorities on weather phenomena, the late **Charles Fitzhugh Talman.** He was librarian of the United States Weather Bureau at Washington, D. C., and wrote many articles for us.

S. F. Aaron, a teacher and life-long student of Nature, has written several interesting articles for us. He makes his home in Elkton, Maryland, where his backyard is a veritable bird haven of martin, bluebird and wren houses.

Louis T. McKim, K. C., is a barrister of Melville, Saskatchewan, and first appeared in Nature Magazine with his *A Case for the Ducks*. He has lived his entire life in western Canada, one of the greatest duck breeding grounds in the world.

Edwin Way Teale, of New York, is a photographer and writer, and is particularly interested in Nature Photography. He will be remembered for his excellent series of pictures in our Rotogravure Section showing the mantis building its froth nest.

R. W. McDermid, a senior at the Yale School of Forestry, was awarded the 1936 Charles Lathrop Pack Foundation Prize for his palmetto article. It was adjudged the "best original article of popular interest on some forestry subject."

Mrs. C. N. Grimshawe, of Miami, is president of The Florida Society of Lepidopterists. She discovered the occurrence in Florida of the black witch, *Erebus odora,* one of the largest and most magnificent of the noctuids, upsetting the accepted theory that this insect does not live in the United States.

Frank T. Bell, former secretary to ex-Senator Clarence C. Dill of Washington, is United States Commissioner of Fisheries, Department of Commerce, Washington, D.C.

Heather G. Thorpe is secretary of the Buffalo Museum of Science, Buffalo, N. Y., and has actively engaged in promoting Nature trail building.

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THE TEN-YEAR INDEX

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Kathryn

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BELL TELEPHONE SYSTEM

In January—Thomas Nuttall

By HOWARD ZAHNISER

THERE are times when even the most ardent and devoted lover of Nature finds the library a surprisingly enticing rival to the out-of-doors and feels that he can roam the fields of literature with a richness of enjoyment at least approaching that experienced in the fields of God. When these times come one often finds peculiar pleasure in accounts of the very season that drives him indoors, and the quaint interest that attends coincidents may enhance one's enjoyment of such works by writers whose lives began at that season. Thus, January, for instance, when "winter's stormy weather" is all about, is the month of the birth of Thomas Nuttall, whose works formed an essential part of the early natural history of America and even now are invaluable sources of enjoyment and information on plants, trees, birds, shells, stones, Indians—in fact, on almost every aspect of the out-of-doors wherever he roamed.

And January came upon Nuttall in many places. Early in his first January—on the fifth in 1786—he came to a humble home at Settle in England's Yorkshire. Twenty-two years later, a printer then, he came to America; and in the following January, by that time transformed into an enthused student of Nature, he was on his way to explore the Missouri River, having left St. Louis on December 31, 1809, with the Scotch naturalist, John Bradbury, and a party of hunters and traders. When Nuttall returned to Philadelphia in 1811 he continued to make excursions in the summer months, but during what his early biographer, Elias Durand, called "the inclement season" he studied his material and worked on his first book *The Genera of North American Plants, and a Catalogue of the Species, to the Year 1817,* published in 1818, Nuttall himself having set type for the book, some parts without copy!

That same year Nuttall was again on his way westward, and in January of 1819 was navigating the Mississippi and making his way up the White and Arkansas Rivers, where January that year was not so inclement and Nuttall on the twenty-second could write that the fields were "already of a vivid green, and the birds were singing from every bush, more particularly the red bird (*Loxia cardinalis*), and the blue sparrow (*Motacilla sialis*). The ground appeared perfectly whitened with the *Alyssum bidentatum,*" and some bright blue flowers were also already in bloom. The next January, after a year of botanical and geological exploration and Indian observations, he was again navigating the Arkansas and the Mississippi, this time on January 3 finding "considerable sheets of ice, near three quarters of an inch in thickness" invading the still water of the Arkansas. The month's end found him in Natchez, and that year he was again in Philadelphia, where in 1821 he published *A Journal of Travels into the Arkansas Territory, during the year 1819, with Occasional Observations of the Manners of the Aborigines,* including its rare accounts of two adventurous Januarys in the out-of-doors that can enliven any winter fireside.

For ten years then, beginning in 1822, Nuttall forsook the excitements of extensive travel and served as curator of the botanical garden at Harvard University, where he published in 1827 *An Introduction to Systematic and Physiological Botany* and in 1832 his two volumes entitled *A Manual of the Ornithology of the United States and of Canada.* It was Nuttall's bird books, written for general readers at a time when Audubon's and Wilson's expensive folios constituted most of America's literature on birds, that merited for him the honor of having the country's first ornithological club named for him. Available in an edition revised and annotated by Montague Chamberlain, it is, for the good fortune of the January reader, replete with observations by Nuttall in even this inclement month. And the charm of Nuttall's writing and the value of his observations are apparent in even random samples. Of the tufted titmouse Nuttall writes, for instance: "To hear in the middle of January, when at least the leafless trees and dark cloudy skies remind us of the coldest season, the lively, cheering, varied pipe of this active and hardy bird, is particularly gratifying; and though his voice on paper may appear to present only a list of quaint articulations, yet the delicacy, energy, pathos, and variety of his simple song, like many other things in Nature, are far beyond the feeble power of description." Of another sort of bird, the red-tailed hawk, in a southern climate, he writes: "On a fine evening, about the middle of January, in South Carolina, I observed one of these birds leave its withered perch, and soaring aloft over the wild landscape, in a mood of contemplation, begin to ascend towards the thin skirting of elevated clouds above him. At length he passed this sublime boundary, and was now perceived and soon followed by his ambitious mate, and in a little time, by circular ascending gyrations, they both disappeared in the clear azure of the heavens."

There were many more interesting Januarys in Nuttall's life. On January 5, his birthday in 1835, he arrived in the Sandwich Islands on a round-about return from the Wyeth expedition to the mouth of the Columbia River, with the ornithologist, John K. Townsend. Back again in this country, he wrote his three volumes on trees, *The North American Sylva,* published in 1842, 1846, and 1849. But in 1842 Nuttall had returned to England to fulfill the conditions of a will bequeathing to him the estate "Nutgrove" yet requiring him to spend nine months of each year in England. He spent only one more January in America, in 1848, when he combined his three-months leave for two years and spent about five months in this country. He returned to England and died there on September 10, 1859. In one evening, though a long evening in January, one can not adequately even suggest the wealth of interest in the life and works of this man of whom Henry Shaw wrote for an obelisk in the Missouri Botanical Gardens in St. Louis: "Honour to him the zealous and successful naturalist, the father of western American botany."

WHEN WINTRY WINDS SWIRL DOWN YOUR CHIMNEY AND YOU INCH CLOSER TO THE FIREPLACE WITH YOUR FAVORITE BOOK, REMEMBER YOUR FEATHERED FRIENDS OUTSIDE WHOSE CONCERTS YOU ENJOYED DURING THE BRIGHT SUMMER DAYS

V 29

NATURE MAGAZINE
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An Ishmael of the Ocean Beach

The story of an abandoned cat who regained her lost faith in man, only to lose it again

By HOWARD J. SHANNON

Photographs by the Author.

WHEN first I glimpsed her, she was slinking past my cabin in a timid crouching pose as if the creature realized that every man's hand was against her. Nor was she far wrong—that wise old beach cat! For, like many others of her kind, she had been deserted by some home-going summer vacationist, and left to shift for herself among the inhospitable autumn dunes. Thus any proffered aid was more than welcome. Yet, when she passed again on another afternoon, and a piece of meat was tossed in her path, she devoured it so hastily as hardly to note the source from which it had come. But when the incident was repeated, a few days later, her departure was less hurried, even leisurely, as if she would linger where such pleasant things could be found.

Only by the most gradual degrees, however, did I win the cat's confidence. A cup filled with milk, and left each morning on the doorstep, won the first half-wary acceptance; for each morning the cup was emptied. Then came the next step; my door was left open and the cup placed inside. And lo! Later in the day, a long rangy creature with thin face and bright brown eyes appeared at the entrance, and peered inside! Glimpsing the cup, the old cat approached it, settled herself beside it and began to drink; for she sadly needed food. How thin and bony her body was, how scarred with abuse where the black-and-brown fur had been torn away! How desperate must have been her struggle to preserve life in that ribbed carcass!

After her busily flicking tongue had lapped up the last drop of moisture, she glanced about her to see what manner of place could provide so miraculous a benison. Her mild and saddened eyes sought mine. Perhaps she saw there something which won her confidence, for thenceforth the cabin became her semi-permanent home.

Yet as she lay on the windowsill in the sun, her habitual demeanor revealed a constant uncertainty as to whether such blessings could long continue. Her nervously flicking ears, her only half-dozing eyes quickened into wide attention at the least excuse, revealing such an alert attendance upon my goings to and fro that one sensed her suspicions, her fears that this new dispenser of life might depart as her one-time mistress had already done so long ago, never to return. So the cat followed me everywhere, like a dog. When I went to the lower beach for driftwood, Beachy, as I called her, faithfully followed; when I paused, so did she, only to nose about among the enticing odors that rose from the scattered sea-wrack. Then, after the basket had been filled and I had started for the house, she came trotting on behind, determined, it would seem, that no inadvertence or lack of attention on her part would permit this belated but most welcome protector to vanish from her presence.

As time passed, her confidence grew. Often she sat on her haunches beside the dinner table and received occasional fragments of food I separated from my own modest repast and tossed to her waiting paws. Nor was she ever importunate. Always her manners were reserved, appropriately dignified, and lacked the boorish urgency

many another reclaimed creature of the wilds would betray. Thus, composedly, we shared our noon-day meals; and though the northeasters roared without and the thunderous turmoil of a storm-driven sea pounded beyond the very door, she accepted my protection and my bounty almost forgetful, it would seem, of past travail.

Yet both body and soul bore scars that had bitten deep. A long bare streak, entirely devoid of hair, extended along her upper forehead, one side of her head and her neck—the result, so I had been told, of a scald produced when a pan of boiling water was cast in her face as she mewed about a cottage door. Minor scars on leg and side showed the results of other painful forays along unwelcomed ways. Curious and revealing peculiarities of behavior too were eloquent of past repulses. Sometimes—and this was long after she had become habituated to her acceptable home—old Beachy would approach my chair, as I sat reading beside the window, set herself to spring upon my lap, hesitate, then turn fearfully away as if doubtful of the reception her presence would receive. How pitiful a confession of many a cuff and blow beaten upon her unprotesting head! Desirous of affection, yet she hesitated to claim it, and rested instead on the drafty floor.

SHE HAD BEEN DESERTED BY SOME HOME-GOING VACATIONIST, AND LEFT TO SHIFT FOR HERSELF AMONG THE DUNES

Not until the colder nights of October came to chill the house and shore, did she overcome her hesitations. Then one evening, as the welcome heat of a crackling wood-fire warmed the precincts of the stove and my lap, she courageously leapt to my knee, seated herself for a moment, then, fully reassured, stretched herself at full length, and fell asleep. Once more, her confidence in man had been restored!

But, as the season was growing late and nearly all other vacationists had left the shore, my own departure too could not long be delayed. So the question arose—what was to be done with Beachy?

Inquiries among the storekeepers in the settlement a mile away discovered one who planned to live there throughout the winter, and was willing to accept the cat as a convenience and companion. So, on a morning, old Beachy took her last look at the dune wilderness, or so I thought, rather uncertainly settled herself in my arms, and awaited another adventure in her already checkered life. All went well until the settlement was reached when a dog appeared—fully a block away. Suddenly, my hitherto peaceful companion stiffened—and lo, my arms were empty. Only a brown streak of fur disappearing down the shore showed where Beachy had gone; only a deep gash in my hand inflicted by her hind claws as she leapt free gave indisputable evidence that I really had held her only a moment ago. Before many hours she was at my door again, and the problem still remained. Then a near neighbor who planned to stay on the beach until Christmas offered to take Beachy in. So she was left in his care.

Hardly had I passed a week at home before the problem recurred anew. For, as work was taking its orderly progress, my mind reverted to that beach companion and her probable fate if some more efficient plan for her lasting protection was not formulated. What would happen when her present provider left for the city? Had I not lived at another settlement and seen other abandoned cats making their desperate attempts to eke out an uncertain existence on the beach? Had I not heard them splashing in the shallow waters beneath my cabin as they fished for such small creatures as wandered in those waters? Had I not seen them attacked by unleashed dogs, and thus provide a Roman Holiday for the ribald witnesses? Had I not come upon litters of kittens so mangled by dogs as literally to be crying their lives away until I mercifully strangled them, one by one, and decently buried their corpses? Thus, knowing the savage disregard to which an abandoned house-cat is consigned, Beachy was not infrequently in my thoughts. Suppose I went to the shore, searched out her whereabouts and brought her home—would she be acceptable to the other members of my household?

The attempt seemed imperatively demanded. With no trouble at all, she was found in her adopted home and brought to the city where she arrived in the early evening. And any doubts I had concerning her acceptance of so different an environment were immediately stilled. When I looked from the front door, through which she had sauntered only a few minutes after her arrival, I saw her perched on the porch post quietly surveying the active scene. Honking cars continually passed to and fro; the air was full of turmoil; but Beachy accepted that populous and noisy darkness with a complete equanimity, wholly without fear. Was its aspect too strange to bear any resemblance to the things she really feared, such as dogs, stormy winds, cold weather, sticks and stones, and

scalding water? Possibly so, for the only object about the house which aroused her habitual anxiety was the broom, however peacefully wielded. Evidently she had painful memories of that implement when used in admonitory ways.

Her affections remained true, indeed, to one person only, that one she associated with this new and comfortable way of life. Even that member of my household most familiar with feline ways, and considerate of their needs, won only a cool acceptance of whatever bounty she offered. Only one member of the family was deliberately sought out for companionship, and that one was he who had rescued her from that harried existence on the purgatorial shore. So oftentimes in the early afternoon, her inquisitive nose appeared at my doorway as she entered, walked composedly across the room, sprang upon my work-table and stretched herself there at full length, as she had stretched herself on another table, amid other surroundings, beside the roaring sea! As she lay there licking her ragged fur, or interrupting herself to look upward at a word of comment from me, the thought occurred to me that these were probably the pleasantest hours old Beachy ever knew.

But another change was in the making, and this is a chapter in my relations with Beachy of which I am not especially proud. Once again the cat had become a problem. For the writer was planning a rather extensive excursion away from home, and the only other member of the family friendly to the task of Beachy's care had become so elderly and indisposed that it seemed unfair to request it. "Perhaps," said some one, "the Bide-a-Wee Home for cats and dogs would provide a solution of the situation." No sooner said than done.

WHEN I WENT TO THE LOWER BEACH FOR DRIFTWOOD, BEACHY FAITHFULLY FOLLOWED

Once more Beachy was consigned to a carrying basket, and taken to the ascertained address where she was accepted and made comfortable. And once more I took a reluctant leave of my familiar beach companion. Perhaps by this time the reader may feel that an altogether undue anxiety has been lavished upon this wastrel of the dunes, this unit of animal driftwood carried by the tides of fate to my door. For it was only an abandoned stray, after all, and not a particularly attractive one at that. But this friendly creature had been a real companion through my lonely hours when the day's scientific studies on the beach had been completed, and the gloom of an autumn night had shut down. For that gloom had been lightened by this modest avatar of cheerful companionship so suggestive of a tentative domesticity. So I owed the stark visitor a debt, a debt which man, considered in an impersonal sense, paid through me to this object of abject misfortune.

It was this realization, as well as my reaction to this animal home for the homeless where dogs and cats of many breeds and from sources manifold comprised the future companions of my solitary wanderer of the dunes—it was all this which prompted my next move. For I had decided to bring Beachy home again.

So on the next day but one, another visit to the Home was made, and my errand stated. And there she crouched, more frightened, probably, than she had ever been before because of the multifarious voices which rang through the place and the presence of her most dreaded enemy, the dog. When she rested in my arms again, her body was stiff with fear and trembled with a fine continuous tremor. Without protest she allowed herself to be placed in the basket where she remained, almost completely silent during the journey home, as if resigned to whatever might befall. (This reaction of my beach cat to the Home does not reflect, in any way, upon the splendid work which is done there. This half-domesticated creature could not adjust herself to any confinement with other animals.)

This quietude, indeed, reminded me how habitual such a demeanor really was, how seldom an outcry escaped her except during that first long trip from the shore. Perhaps one recalls with a tempered amusement that poet's phrase, "a grief too deep for tears," and yet seriously realizes that the sufferings of this Ishmael of the shore might well have deadened the impulse for outcry, and left instead this patient acceptance of a mysterious and ever-changing fate. For this experience at the Home left an ineffaceable mark upon the creature's consciousness, and in her relations toward me. Never again did she accept her protector with the same innocent confidence she had shown before. A cloud hung between us: she half-avoided my presence. For it was my hands—those hands she had learned to trust—which had consigned her to that Strange Hell where Devil-dogs dominated the darkness.

Poor Beachy! Symbol of all those unregarded lives that crouch and wend their ravaged ways throughout our alleys, our farms, and our countrysides—how pitiful their existences really are! How (Continued on page 57)

PREHISTORIC WEATHER

By CHARLES FITZHUGH TALMAN

A FEW years ago members of Admiral Byrd's last Antarctic expedition climbed a glacier less than 300 miles from the South Pole. In the rocks at its summit they found a deposit of coal. Previous expeditions had discovered coal at other places in Antarctica, and it now appears that the coalfields of that ice-bound continent may be among the largest in the world. The fact is of interest on account of its economic and political bearings, but also for another reason.

The coal fossils brought back by explorers reveal a picture of the climatic conditions that prevailed in the Antarctic at the time the coal-making plants flourished there; supposedly around 250,000,000 years ago. The climate was mild, humid and windy. On the wind-swept hills plants were rather scarce. In the valleys there was a luxuriant swamp vegetation of ferns and trees.

Geological evidence also tells us something about Antarctic climates at other remote epochs. There were long periods when the land was a cold desert, though not ice-covered. There were others when it was a warm desert. Great glaciers appear to have formed for the first time about 60,000,000 years ago.

The weather of the past is gone beyond recall. Unlike the pottery of ancient cities and the remains of extinct plants and animals, it cannot be dug out of the ground; yet in a multitude of ways it has left records of its activities, and the interpretation of these records is one of the fascinating tasks of modern science.

Many fossils besides those of the coal measures indicate the atmospheric conditions to which the once living organisms were adapted. Thick layers of ripple-marked silt, buried deep in the earth, show the places where great rivers once flowed through regions now waterless. Sun-cracks in these layers tell of hot summers. Coral limestones found in old geologic strata must have formed in warm seas. Annual rings in fossil tree-trunks mean that the trees grew where winter cold alternated with summer warmth, rather than in a climate with little seasonal variation of temperature such as now prevails in the tropics. Boulders are mementoes of the huge migrating glaciers that scattered them far and wide over the land. Deposits of salt and gypsum found beneath the soil are the products of former desert climates in lands now fertile.

PHOTOGRAPH BY U. S. GEOLOGICAL SURVEY

THE RECORD OF A PREHISTORIC RAINSTORM

Raindrops that fell millions of years ago left their impressions in this Utah limestone. The form of these cavities indicates the force and direction of the accompanying wind

Records of rainstorms that occurred millions of years ago are found today in the shape of the small round marks known as "rain-prints" or "fossil raindrops." There is no mystery about the formation of these marks, for the process is still going on and can easily be observed. A sea beach, for example, may often be seen after a shower to be pitted with the little depressions made by the drops. If the wind blows from the land, these pits are likely to be filled with dry drifting sand. If a square of this material is carefully cut out and baked hard, we obtain impressions of a durable character.

The rain-prints collected by geologists throw a certain amount of light upon the weather and climate of the past. Their age can be determined approximately from the accompanying fossils and other characteristics of the formations in which they occur. Thus

COAL AGE VEGETATION

Vast coal fields recently discovered in the Antarctic are proof that the South Pole basked in warm sunshine 250,000,000 years ago. At this period landscapes much like the one here pictured must have prevailed. Photograph from a painting by W. Kukuk in the Geological Museum, Bochum, Germany

PHOTOGRAPH BY DR. R. DE LURY

ANNUAL RINGS IN A FOSSIL TREE TRUNK

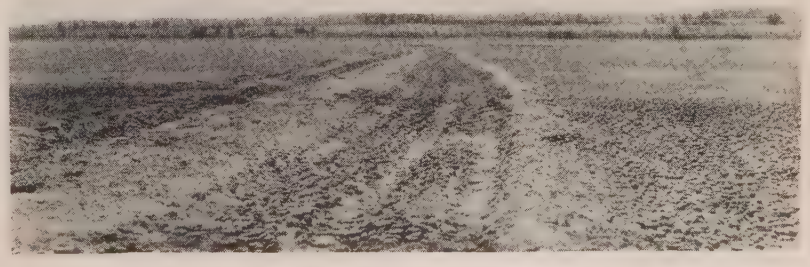
This spruce tree, which probably grew more than 100,000 years ago, was laid bare by the retreat of a glacier in British Columbia. As in trees of modern growth, the varying thickness of the rings indicates periods of rain and drought

their prevalence gives some indication of the relative raininess of different geological periods in particular regions, and the character of the rainfall. Their forms likewise indicate the direction and force of the winds accompanying the primeval shower. If the wind blew from the south, the southern side of the depressions will slope downwards gradually toward the north, while the opposite slope will be more or less precipitous. The greater the contrast between the steepness of the opposite slopes, the stronger must have been the wind. Symmetrical depressions were formed in calm weather.

A good many years ago the geologist Baron de Geer discovered in Sweden some remarkable yearly weather records in rocks that were once the clay beds of lakes fed by the summer melting of glaciers during the declining stage of the last Ice Age; and similar discoveries have since been made in other parts of the world. The glacial streams carried much sediment into these lakes. Coarse sediment sank quickly to the bottom, but fine sediment remained for a long time in suspension, finally settling down after the flow of the streams had ceased with the oncoming of winter. The rocks resulting from this process are banded with alternate layers of coarse-grained and fine-grained material; the former light in color, the latter dark. Each pair, representing a year's deposit, is called a "varve." Because more ice melted and more sediment was deposited in hot summers than in cool, some varves are much thicker than others, and these differences give us an interesting record of yearly variations of temperature for certain portions of the earth and for particular periods of the remote past.

An entirely different sort of varve recently has been discovered. It consists of two very thin layers; a darker one composed of organic material and a lighter one of mineral material. Varves of this kind are supposed to have been formed, not by the melting of ice, but by deposits of sediment in lakes and seas containing an abundance of minute organisms. The remains of these tiny living creatures deposited at a particular season of each year—probably when their mortality was greatest on account of the cooling of the water—are believed to have formed the dark layers. As the amount of living matter in the water varied with temperature, the layers are supposed to indicate by their relative thickness variations of temperature from year to year, just as do the glacial varves. The biggest known deposit of "non-glacial" varves, as these layers may be called, is the one found by Dr. W. M. Bradley in parts of Wyoming, Utah and Colorado that were once covered by a vast inland sea. The deposit is 2,000 feet thick and furnishes yearly weather records extending over many millions of years.

In many parts of the temperate zone, lakes left in the wake of the retreating Ice Age glaciers were gradually filled with accumulations of plant material and thus converted into bogs. In these bogs are found some interesting records of the climatic variations that have occurred in their vicinity during the past ten thousand years and more. Most of the mucky substance below the surface of the bogs is decayed beyond recognition, but



PROOF OF A FORGOTTEN DROUGHT

Goose Lake, California, was laid bare by a drought in the summer of 1926, and on the lake bed were found these wagon tracks, probably made by a pioneer of the 1840's, indicating that an unrecorded drought must have prevailed at that time. Photograph from the Yellowstone Cut-Off Association

myriads of tiny pollen grains that were blown into the lakes at various times from surrounding vegetation are so well preserved that the species to which each belongs can be identified under the microscope.

With the aid of a special boring tool, samples are taken from different depths in a bog. Examination of the pollen found in these specimens shows the types of vegetation that grew from age to age in the vicinity, and each type of vegetation implies the prevalence of a certain type of climate at the time of its growth. Predominance of northern pines, for example, indicates a cool dry climate; spruce and fir point to a cool and humid one. Hardwoods grew when rainfall was abundant; grasses replaced trees when rain was scanty. The rate at which a bog formed can be roughly estimated, and thus approximate dates can be assigned to the periods when the different kinds of climate prevailed.

There have been several Ice Ages when enormous glaciers spread over the continents from centers in high latitudes. Each is supposed to have included relatively cold and mild spells—called "glacial" and "interglacial" periods, during which the ice blankets alternately advanced and retreated. These variations imply that the main wind belts and storm tracks shifted widely, and that climatic conditions everywhere varied greatly.

The annual rings of growth seen in cross sections of tree trunks vary in thickness more or less closely with the weather prevailing at the time of their formation. In some parts of the world the thickness of the rings depends mainly upon rainfall; a thick ring denotes a wet year and a thin ring a dry one, as has been proved by comparing rings of recent growth with actual measurements made with rain-gauges in the vicinity.

More than half a million rings in about five thousand specimens of wood have been measured by Prof. A. E. Douglass and his assistants in the southwestern United States, and they give us for that part of America a record of rainfall variations extending back more than twelve centuries. One of its interesting revelations is that a great drought, surpassing in intensity any that has occurred on our continent in historic times, prevailed in this region from 1276 to 1299 A. D., and there is evidence that it caused a general exodus of the Indians then living in the region affected. The next most protracted drought registered by the trees lasted from 1573 to 1593.

In fossil trees, some of which grew many millions of years ago, the rings show similar variations and thus furnish clues to the vicissitudes of ancient weather.

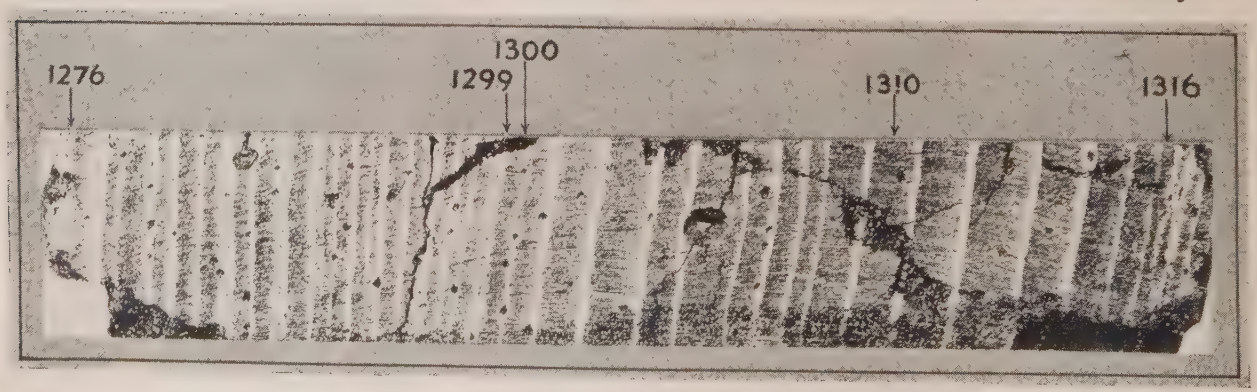
Beginning in the Middle Ages there are records of other kinds from which we can get some idea of climatic conditions and of the variations of weather from year to year. We know, for example, the dates during long periods of time when certain rivers and harbors were frozen over in autumn and were opened in spring. There are also recorded the dates year by year when certain crops were sown and harvested in various European countries, including records of wine harvests in France back of the year 1400. Variations in lake levels have been recorded in some regions. Those of the Caspian Sea furnish an index of rainfall covering more than a thousand years.

Explorations on the sites of former settlements afford evidence as to the climatic conditions under which the inhabitants lived. Such evidence, as well as that drawn from history, is, however, easily misinterpreted, and both have been the basis of fallacious beliefs concerning radical climatic changes. The commonest mistake has been to assume a progressive diminution of rainfall in regions where agriculture once flourished but is now impractical. In many such cases the present inability to grow crops is due to the fact that the fertile soil has been washed away (a process that is even now ruining many agricultural lands) or has been buried under windborne sand from deserts. In other cases, a scanty rainfall was formerly eked out by irrigation, but the irrigation works have fallen into decay as a result of political catastrophes or racial deterioration.

Nearly everywhere in the world we hear the popular assertion that "the climate has changed." So it has, though not so rapidly as the man in the street supposes. The big changes occupied probably millions of years; the smaller ones lesser periods. Yet grandfather will probably tell you it was colder when he was a boy.

A THIRTEENTH CENTURY DROUGHT RECORDED IN WOOD

This charred beam found in Indian ruins in Arizona reveals the weather conditions from the year 1276 to 1316. Note the thinness of the annual rings from 1276 to 1299, indicating stunted growth of the tree from scanty rainfall. From 1300 to 1316 rain must have been plentiful, as the rings are considerably wider. The tree grew as much in the ten years from 1300 to 1310 as it had in the 24 years from 1276 through 1299



One Man's Bird Family

By LOUIS T. McKIM

PERHAPS no man on this continent has succeeded in establishing more friendly relations with the birds than has Charles E. Jones of Vancouver, British Columbia. Suffering from a physical disability that would confine most men to their beds, Mr. Jones, about eight years ago, began the experiments that have added greatly to his enjoyment in life and brought him considerable fame. When I visited his home early in April he ushered me at once into a cage containing one hundred or more of his feathered friends, several of which flew to meet us, some alighting on my head and shoulders. During my stay a number of other visitors were admitted, all receiving a like welcome from the birds, who showed absolutely no fear of strangers.

Mr. Jones crunched peanuts in his mouth and his pets fought good-naturedly for a place on his shoulders from which to reach their unusual feeding station. A beautiful male pine siskin exhibited a self taught trick that gave him an advantage over his sprightly rivals. Repeatedly, this little fellow lit on Mr. Jones' head and dropped down to perch on his benefactor's nose and eat from his lips. The bird with the black crest is an Indian bulbul, famous in the literature of the Orient.

Last year the siskin, having no mate, undertook to assist the canaries in their housekeeping duties. For some days he contented himself with feeding the incubating birds but later decided to appropriate a nest for himself. Despite all resistance he ousted a pair of the parent birds and assumed the care of their nest of fledglings, an arrangement which proved disastrous, as the siskin would on no account leave the nest even to obtain food for his adopted family.

ALL VISITORS RECEIVE A ROYAL WELCOME

The inhabitants of Mr. Jones' bird haven have no fear of humans. They fly to meet you and alight on your head or shoulders to seek a tidbit

The cage was tenanted chiefly by canaries and other varieties of the Finch family. The goldfinches, commonly wild in British Columbia, mated freely with the canaries, the cross-bred birds making splendid songsters. Black-headed grosbeaks and purple finches occupied the same quarters and appeared to maintain friendly relations with the smaller feathered folk.

Eight robins and a meadowlark enjoyed another enclosure and fought an intermittent battle with a quarrelsome song sparrow that had found its way into the cage from the surrounding woods. The robins perched on Mr. Jones' shoulders and upon being told to "ring the bell" caught his ears firmly in their beaks and shook them vigorously. A liberal helping of peanuts rewarded them for this performance.

The meadowlark came when called and staged a spirited battle with the Bird Man, continuing to fight with beak and claw even after he had been turned over on his back. He emerged from the conflict unruffled and hopped to his adversary's shoulder for refreshments. This bird sang frequently, with notes quite unlike anything I had ever heard, the quality of his voice probably being due to his close association with so many accomplished singers.

At various times this bird lover has bred red-winged

THE PINE SISKIN IS THE BOLDEST OF ALL

His favorite trick is to perch on Mr. Jones' nose and pluck a peanut from his lips

and Brewer's blackbirds, song sparrows, thrushes, cedar waxwings, Japanese starlings and other varieties commonly found wild in his neighborhood. Many fine photographs testify to the fact that these birds have become quite as tame as the cage varieties. Since it is not possible to keep them all living agreeably together, many have been liberated.

Mr. Jones is a wizard at providing each species with its natural food, but perhaps his greatest achievement consists of inducing so many species of wild birds to nest in captivity. Although this man cares for over two hundred birds, and his quarters are limited, their plumage was perfect, and all seemed to be in excellent health.

Mr. Jones would not reveal the secret of his success, but unquestionably the friendliness of the birds may be attributed largely to the fact that he feeds the young even before they leave the nest, and practically lives in the midst of his tuneful family.

SMOKY, THE PUP, IS WELL LIKED ALSO
Some of the birds perch fearlessly on his head while others make a lunch of a few crumbs that have been scattered on his back

ARIZONA VERDIN

By HARRY L. and RUTH CROCKETT

A GLORIFIED bush-tit that does not care to make a winter migration is a fair description of the Arizona verdin. Striking in appearance, these little gray, yellow-headed sprites range over the desert areas of the Southwest calling to each other with voices much too great for their size.

Winter does not come early to them but the nights are cool by the middle of October, when they start to build their winter shelters. These are balls of small sticks, twigs, leaf stems and fibers placed high up in a thorny bush or tree. When these are available, they prefer twigs from the cat's-claw. These balls of sticks are lined with feathers and plant down to make them warm and cozy. During the winter the birds are often seen in couples, but when the shelters are built they are large enough for one bird only. However, there may be several shelters within a small area or even in the same bush. The entrance is a small hole at the side and below the center, and is nearly concealed.

In the spring the verdins build a larger nest of much the same pattern, making the walls thicker by using more leaf stems. These are often built in trees at the side of washes. In these brooding nests they place their four to six eggs, and by the end of April are feeding their first brood the small caterpillars and other insects that they find in the terminal branches of the desert trees.

THE ARIZONA VERDIN SURVEYS HIS HOME
This is the brooding nest of the species in which are placed the four to six eggs. The bird also builds a cozier home for winter occupation

The Spiders— Our Friends

By S. F. AARON

ALL THE creatures that are of benefit to mankind are not two-, four- or even six-legged. There is a large group with eight legs and, oddly enough, with that many eyes. They are among the most industrious and intelligent of lowly beings, deserving of favor for the influence they exert upon the very existence of man. They are the spiders, the wise engineers, destroyers of winged and crawling pests, and too often misunderstood.

If it were not for the number of spiders everywhere, all living creatures, except certain defoliating caterpillars, might face starvation. Certain species of Arachnida are the chief enemies of widely injurious insects that would destroy all vegetation in a brief time. There are numerous parallel conditions in Nature where the existence of one or many species depends on that of another often widely unrelated. Man is but one in the list of these dependents.

Spiders are familiar creatures and there has been much published about their habits. Yet it is strange that little has been said about their economic importance, and even extensive government biological and entomological work has overlooked the subject.

In numerous instances, spiders have been included in lists of injurious insects eaten by birds. Any disapproval of spiders is due to an ignorance concerning them that may even exist among scientific specialists in other groups. As for the general public, small and grown folks, male and female, have possessed a common and often voiced fear or horror of these generally harmless, though perhaps none too prepossessing animals. The wonderful industry of spiders, their remarkable engineering ability, their often beautiful colors, and their evident high order of invertebrate intelligence have been for the most part appreciated by Nature students alone.

The value of spiders in destroying noxious and pestiferous insects is incalculable. Even those species that weave no silken strands, except to encase their eggs or young, and that must hunt their prey on foot, catch and kill numerous vegetable-feeding beetles and moths and their larvae, including the cut-worms and army-worms as well as many grasshoppers and locusts. The jumping spiders get leafhoppers and other plant-puncturing forms, both high and low, while the crab spiders on various blossoms capture with their long front legs all sorts of winged interlopers that during their transformations are responsible for injury to flower and fruit. Among these pests are the ants, which aid and abet the numerous plant lice. As for the web funnel-makers, they, too, get abundant grasshoppers, locusts, June beetles and low-flying moths, while the webs of the orb weavers in high grass or trees often become lined with gnats, mosquitoes and various stouter-bodied flies.

THE HOME OF THE JUMPING SPIDER

The web nest has been cut away to show the egg sac. The entrance is from above

Among the shade trees of town and village streets and outlying groves, the destructive, long-plumed caterpillar of the tussock moth, abundant almost everywhere, is a choice morsel for the jumping spiders.

Among the most destructive of noxious insects is the fall webworm, *Hyphantria cunea,* which attacks many kinds of woody and herbaceous plants among which are nearly all the fruit and common shade trees. The caterpillars always form colonies, often of a hundred or more, each individual contributing to the ugly, tangled and interwoven web as a protection against many enemies. Feeding at night and on cloudy days, the caterpillars leave the web and devour the leaves.

Branches or entire trees may be totally defoliated and it is a certainty that if these caterpillars were to meet with no resistance they would destroy nearly every green and growing thing, and dominate vegetable productiveness. The local and regional devastations of the army worm and western locusts would be trifling in comparison.

The webworms, within their compact quarters throughout the day, are safe from birds; the hymenopterous parasites reach and attack them with difficulty. But several species of spiders, though not web builders themselves, are endowed with the talents of their kind, and

AN UGLY WEB WORM NEST

Certain species of spiders are active in destroying these pests

invade the tents of the webworms, where they find themselves perfectly at home. Being themselves thus protected and needing food, they calmly feed upon the rightful inhabitants and thrive accordingly. This work of destruction, which may begin when the worms are less than half grown, often completely annihilates the colony, or at least leaves very few of the caterpillars that are not drained dry of their life juices. To this great extent are we indebted to these much-maligned creatures.

This arrangement, altogether satisfactory to the spiders, reminds one of man-eating tigers in an East Indian village. There are no champions among the caterpillars to combat the aggressive spiders; the worms coordinate in web building, but they know not the value of unity in fighting battles, though they might easily prevail against the three or four spiders that usually occupy each web.

Nature's Largest Seed

By WILLIAM ATHERTON DuPUY

GERMINATING in a barrel in Honolulu's public nursery is the world's largest seed, shipped all the way from the Seychelles Islands in the Indian Ocean to astound Hawaii's visitors. The seed weighs thirty-two and one-half pounds.

Five other seeds from the same plant, the smallest of which weighs sixteen and one-half pounds, are receiving the same care, that the strange germ of life within may stir into being. The seeds, commonly called double coconuts, are not coconuts at all. They are the seeds of a palm tree known to science as *Lodoicea seychellarum.* Among the islands of the Indian Ocean they are called *coco de mer,* since they were first found floating far out at sea.

When finally traced to the Seychelles Islands the species was identified as one of the fan palms. *Cocos nucifera,* the coconut palm, belongs to a widely-differing group. Unlike coconuts, these strange seeds have smooth exteriors and are shaped like huge peppers. They require one year to germinate and as many as ten years may elapse between the fertilization of the flower and the ripening of the seed. The trees in native habitat attain a height of 100 feet under favorable conditions.

These six seeds were sent to Dr. H. L. Lyon, head of the forestry department of the Hawaiian Sugar Planters' Association by the director of agriculture of the Seychelles Islands. The plants that spring from them will take their place beside the sausage tree of South Africa, the wide-spreading banyan tree of India, the native sandalwood, and the other strange tropic giants in Honolulu's parks.

NO, THESE ARE NOT COCONUTS

Compare these giant fan palm seeds with the sun helmet in the foreground

The Poodle and the 'Coon

By EDWIN WAY TEALE

Two odd playmates romp and wrestle like kittens at the home of Emmett Wagner, a thirteen-year-old boy who lives in Baldwin, Long Island. They are Teddy, a Canadian raccoon, and Billy, a poodle dog.

When Teddy was three months old, he rode four hundred miles by automobile from Canada to Long Island —most of the time perched on the shoulder of his master or curled up asleep in a corner of the back seat. When the newcomer reached Baldwin, Billy, the poodle, eyed him with suspicion. This suspicion proved justified, for the first time the dog came near the raccoon, he got his leg nipped and the battle was on.

After the bushy-haired stranger had been put in his place, the two became inseparable friends. Now, they roll and wrestle by the hour with a great show of mock ferocity and, at meal-times, they make a game of trying to steal tid-bits from each other's dish.

Teddy will eat bran mixed with maple syrup when he turns up his nose at everything else. Whipped cream also has him standing on tiptoe, begging for a taste of this delicacy. With one sweep of his paw, the raccoon will circle the inside of the bowl and collect the remaining cream. Then, he sits down to lick it off at his leisure. Of all desserts, however, peanut brittle candy is his favorite.

Curiously enough, he seems to enjoy the taste of flea soap! On Saturday nights, Teddy gets his bath in the kitchen sink. Wax, picked up in rolling and sliding on the kitchen linoleum, sticks to his long fur and has to be washed out. Oftentimes, he hinders progress by trying to lick soapsuds from the hands that are scrubbing him. Occasionally he will slide the length of the sink under water, coming up with the cake of soap in his mouth, just as though he had been diving for a fish.

BILLY AND TEDDY ARE SHAMEFACED

Reprimanded for their rough-house antics, they assume their best "we're sorry" expressions

Whenever the two pets make a tour of the house, the raccoon stops to investigate every pot or jar. He runs one fore paw around inside to satisfy himself there is nothing edible within before he proceeds. Any loose bit of wallpaper or linoleum catches his eye in an instant and the slender fingers of his fore paws are soon at work "stripping off the bark." In the course of such activity, he has torn up a corner of the kitchen linoleum, stripped the oilcloth from behind the gas-stove and removed pieces of wallpaper from two rooms and an upstairs hallway. Recently, a living room was completely repapered. Just as the job was done, the raccoon was noticed rolling over and over playing with a six-inch piece of paper. He had torn it from one of the corners where it had been pasted in place a few minutes before. That was the last straw and ended Teddy's freedom of the house.

It was while this room was being renovated that the raccoon did one of those amusing, human-like things that make pets such entertaining company. Powdered plaster, falling on the floor, had made a thin white layer. Teddy dipped his fore paws in Billy's water dish and walked through the white powder, looking back over his shoulder to see how his tracks were showing up. When they began to be less evident as his fore paws dried, he would go back to the dish, wet them again and start off to make a fresh circle of tracks.

As his weight and size increased, Teddy found it more

TEDDY LEARNS THE WORLD IS ROUND

After wandering about through the reeds that surround his home, Teddy suddenly discovers that he's back from whence he started

and more difficult to turn around inside his little kennel. Finally, he hit upon the scheme of entering, ducking his head, doing a half loop and coming back, lying with his feet in the air and his head at the door where he could keep a weather eye open for Billy.

During spring and summer months, the struggle between these two animal chums is nip and tuck. But when fall days arrive, Teddy begins to lose his zest for battle. By wintertime, he is snoozing most of the day in his special kennel.

Billy, missing his lively playmate, trots about rather disconsolately, sole but lonely master of the house.

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It is with sincere regret that the Directors of the American Nature Association announce the resignation of Mr. P. S. Ridsdale from the editorship of Nature Magazine and as a director of the Association. He has occupied both posts since the formation of the American Nature Association in 1922. In view of the approach of his sixty-fifth birthday, Mr. Ridsdale has asked that he be relieved of these responsibilities in order that he may concentrate, for the time being, upon his forestry work as manager of the American Tree Association. The officers and staff of the Association and the Magazine join the Directors in expressing regret that Mr. Ridsdale feels this step essential.

The responsibility of the general editorial direction of Nature Magazine and its policies will be assumed by Mr. Arthur Newton Pack as Editor, and the vacancy on the Board of Directors will be filled by Mr. Randolph G. Pack.

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Orchids To You!

By RAYMOND S. DECK

CERTAINLY I know little of the canonized orchids one associates with ermine wraps. Perhaps, though, I might call myself a connoisseur of orchids-in-the-raw for I've seen a lot of flowers of the clan: rattlesnake plantain and Adam-and-Eve carpeting the woodlands among my boyhood West Virginia hills; orange-fringed orchids glowing like flame on swampy plains; sweet ladies' tresses surviving in unravaged nooks in New York City itself. And there were wild kinsmen of the ballroom corsage dangling from the jungle roof along the Amazon; the grassy shoots that sprang up by magic after tropical rains and spread the Venezuelan savannas with an unending carpet of orchid-gold.

Hardly one of the lot brought the thrill of discovery which came to me one morning last June as I tramped over familiar brush-clad slopes up Connecticut way. That ten-inch plant with its whorl of blue-green leaves! It looked a bit too succulent to be the Indian cucumber, *Medeola,* growing all about. I stooped and saw a fragile miniature of the florists' orchid poised above the green-rayed star of leaves, a tiny white flower with a splash of purple in its throat, guarded by three long ruddy sepals. *Pogonia verticillata* at last. Here was the botanical *rara avis* that even Gray's Manual conceded to be "not common"!

Three more plants, all in bud, grew beside my prize. And now that my eyes were opened I discovered that I was in a very garden of rare orchids, with a clump of a dozen among the ferns and club-moss in the woods-road and others scattered in little patches all over the hill! No doubt I'd seen their kind a thousand times in the years I've been haunting those rugged acres but had mistaken them for Indian cucumber. Both plants wear their leaves in whorls and their growth is amazingly alike. *Pogonia's* stem is plump and translucent however, while that of the "cucumber" is wiry by comparison, and wears a cottony sheath. But don't think their differences are too obvious; I compared a good many before I could tell them at a glance.

A RARE ORCHID IS NAMED

Believing a friendlier name than Pogonia verticillata necessary, the author has christened this beautiful blue-green orchid "Star Pogonia"

This delightful little orchid should have some friendlier name than merely *Pogonia verticillata.* Why not fingerprint all of the Indian cucumber plants we see after this and, if we find "not common" orchids among them, declare that we have seen the Star Pogonia?

THE SABAL PALMETTO

The tree that wears boots

By ROBERT W. McDERMID

HAVE you ever seen a tree that wears boots? A tree that not only wears them, but is a manufacturing bootmaker, who operates solely for home consumption? If not, permit me to introduce the Sabal palmetto, alias "The Cabbage Tree," alias "The Tree That Wears Boots." Truly a meticulous dresser, this palmetto will have none of your ready-made gear—not while the rain and the sun and the earth supply the raw materials for manufacture.

South of Cape Hatteras, along the edge of the blue Atlantic, down the pointing finger that is Florida, and to the Gulf of Mexico, in a land where the winters are mild, and the summer sun beats down with relentless vigor, lies the kingdom of the palmetto. It is a varied country in which our democratic monarch of swamp and lowland passes its peaceful existence, here reaching out to touch the foliage of the longleaf pine, there rubbing elbows with that aristocrat of the coast, the royal palm, or bowing in the breeze to that pirate of the bounding main, the mangrove. The Sabal seldom reaches a height of more than fifty feet, but bears fanlike leaves that are often six feet in length, and a network of visible roots that remind one of nothing so much as the snaky locks of Medusa.

Perched along the sides of the Sabal's trunk, pointing outward and upward like a stairway to the top, are the stems of the gigantic leaves that were broken off about a foot from the trunk as the tree grew in height. The stubs remain attached to the trunk in such a manner as to give one the impression of spikes. A tree that is possessed of these is commonly spoken of as "having its boots on." Being composed of much softer tissues than the trunk, these relic stems are much more susceptible to decay and gradually drop off as the tree reaches maturity.

If you have an ache or a pain, palmetto berries are a sure remedy, provided you have the implicit faith of the coastal Negro, who uses them to cure any and all ailments from rheumatism and insomnia to the ever-present "misery." Even the swamp animals, the half-wild pigs, dogs, and rabbits, tacitly admit their qualities as a mild cathartic, choosing them over the usual grasses. That these qualities are not all imaginary is evidenced by the fact that several of the small towns of coastal South Carolina are shipping the berries to the North for use in the manufacture of drugs. The berries, or drupes, to be scientifically exact, are globular in shape, about the size of a wild cherry, and are filled with a pulpy substance that is quite sweet. The Seminole Indians in Florida obtain a part of their molasses by crushing these berries and boiling down the juice until it has become thick and syrupy.

With all deference to other trees of greater commercial importance that are indigenous to the coastal South, perhaps none is more admired locally or used in more widely varying ways than the palmetto. To the artist, a subject worthy of his best efforts; to the marine contractor, a sturdy piling; and to more than one canny craftsman, an income! Do you want a truly beautiful and unique table? Wait while the cabinet maker finishes his polishing of that cross-section of dried palmetto. A basket? Here is one freshly woven. Food? By all means! Do you prefer your cabbage boiled, or would you like some really delicious palmetto pickle? A thriving little industry has sprung out of the last-named use of the bud, or "cabbage," near Charleston, South Carolina. The pickle is made from the terminal bud of the tree, which contains the tender, furled leaves, ranging in length from one to two feet. Gathering the cabbages, or "robbing," as it is called, results in the death of the tree. Those from which the cabbage has been taken and are of sufficient size are disposed of among local contractors for use as piling. If too small for this use, they

THE SABAL PALMETTO
The trunk is covered with the stems from which leaves have fallen, these pointing outward and upward like a stairway to the top

SENTINELS OF THE BEACH

The "boots" are really stems of gigantic leaves that have been shed during the growth of the tree, and even these are dropped as maturity is reached

are manufactured into various types of novelty articles.

The use of the palmetto for piling was commented on by Michaux, who stated in his *Sylva* (1819) that "—this use of the Cabbage Tree is rapidly diminishing its numbers, and probably the period is not distant when it will cease to exist within the boundaries of the United States". Despite this dire prediction, the palmetto is more than holding its own against the commercial inroads that are made annually, and areas where millions of trees grow may be seen in Florida. Although there has been a considerable falling off in the demand for palmetto piling since the advent of creosoted material, large amounts of it are still used. The primary advantage that this wood possesses over its fellows is its immunity to attack from marine borers.

Among the classic examples of the use of palmetto, and one that effectively suggests the character of the wood, may be cited the story of Fort Moultrie, near Charleston, around which the great seal of South Carolina is based. The original fort was built of palmetto logs, and commanded the entrance to the harbor. The now famous story tells how Sir Peter Parker, admiral of the invading British fleet during the early part of the Revolutionary War, stormed up to the mouth of the harbor with his ships of war and was soundly trounced by the batteries of Fort Moultrie. The British vessels hurled broadside after broadside of grape shot at the fort, only to have the projectiles strike the spongy palmetto logs and sink from sight, spending their energy without result. The garrison of the fort made short work of the attack and thereby prevented the capture of Charleston. One side of the seal of South Carolina, designed shortly after the battle took place, depicts a palmetto tree erect over the prostrate form of a British oak.

More prosaic uses of the trunk of the palmetto include its manufacture into walking canes, its use as logs in the construction of barns and outhouses, and its use as watering troughs for stock or as conduits for the conveyance of water above ground. The spongy outer bark is sometimes employed as a substitute for scrubbing brushes, and the roots are a valuable source of tannin, which is used extensively in the manufacture of leather.

The leaves or fronds of the palmetto are widely utilized in the south in the manufacture of fans, baskets, fly brushes, and hats. Houses and barns made of the logs are often thatched with the fronds. The leaves are split and used to make ropes, mats, and fish stringers. And a dance without palmetto decorations is really no dance at all!

In its relation to its environment the palmetto is most adaptable. Its range in soil conditions runs the gamut of types from sterile beach sand and almost bare rock, to the deep rich earths of the swamps and even perpetual water. "Let the seeds fall where they may" might be fittingly used to paraphrase the old saying, in describing the habitat of the palmetto. A decaying stump makes a perfect nursery for the young seedling, as does a knot hole, or the crotch of a tree. The palmetto evidently goes on the assumption that matters could be a whole lot worse, and then proceeds to make over its unsought resting spot into a place of comfort. Amid the primeval live oak hammocks in Florida may be found veritable hanging gardens; spots where the palmetto has found suitable growing conditions above the ground, on trees. Growing under such conditions it is an epiphyte, which in scientific vernacular means simply that it grows upon other plants but not as a parasite, for while the young palmetto may welcome the opportunity thus afforded to gain a place in the sun, it does not rob its host of nourishment. When and if the host tree dies, the palmetto takes to the ground and continues to grow as though nothing had happened. To the palmetto tree water is simply another place to grow, and grow it does. If the water dries up, there may be a mass of roots clustered about the base of the trunk, but these are capped on the ends, and become dormant until the next rainy season replenishes the water supply. Should the fresh water pool in which the palmetto is growing suddenly become salt from an exceptionally high tide, this amazingly complaisant tree accepts the situation phlegmatically, and continues with the business in hand. Even fire, that dread enemy of every living thing, does not completely check the palmetto.

The visitor to the coastal south has a soul-stirring experience in store for him if he has never had the opportunity to walk through a dry swamp and see the palmettoes with their bushy side roots covered with green lichens from which grow sedge grasses, hempweed and asters. To these visitors, the experience is unforgettable. To those who know and love the palmetto and its companions of swamp and savanna, it is a time of quiet and intimate communion with Nature.

The Red-Bellied Mud Snake

By FLORENCE MOORE GRIMSHAWE

A REPTILE that spends a greater part of its life underground, burrowing in the soft, moist earth in search of its food, is the red-bellied mud snake, *Farancia abacura.*

It is found at low altitudes in our southern states from North Carolina to Florida, and west to and including Louisiana, and in the Mississippi Valley north to southern Indiana. It is most abundant in the Gulf States. Here it has been found on several occasions as much as ten feet below the surface. Its wanderings above ground in its native habitat are of brief duration, and are primarily limited to the mating season, when it frequents sloughs or saw-grass marshes.

This harmless species is unwittingly responsible for the stories of the "hoop" snake, and the "stinging" snake, wide-spread belief in which amounts to a conviction in certain sections. The mythical snake referred to in these tales forms himself into a hoop, and rolls through the forest with breakneck speed. Should it collide with anything its sting is brought into play with fatal effect, even if the object of its wrath be a forest tree. Needless to say, the sting, under the right circumstances, is fatal to human beings. The only basis for the story is the fact that at the end of the snake's tail is a minute sharp spine, with which it sometimes inflicts a slight wound, comparable to a pin-prick. This spine is probably useful to the animal when feeding. As to the "hoop" tale, Ditmars mentions seeing an individual lying under water in a loose coil that gave the appearance of a hoop. Such an observation made by a credulous person might give support to the "hoop" belief.

A SIX FOOT SPECIMEN

The author has captured a full grown mud snake. The snake is harmless and usually does not retreat if one approaches with friendly intent

This showy species is particularly attractive when it has just shed its skin. Then it displays to good advantage its iridescent ebony-black upper parts, set off by the vermillion v-shaped blotches on its sides. The abdomen is a brilliant vermillion marked with black blotches. Its scales are smooth and glossy to a degree surpassing any other of our snakes. The eyes, small and dull, and located high on the head, are equipped with a thick sheath that affords protection during its subterranean maneuvers.

The food of this snake consists almost entirely of salamanders, and this fact is probably the reason for its choosing an underground habitat. Recently it has been ascertained that two species of modified large amphibians, whose ranges are similar to that of the mud snake, form an important part of the food of *Farancia.* These are *Siren lacertina,* that strange near-salamander, with slender eel-like body and no hind limbs, and the so-called Congo snake, commonly called "conger eel," *Amphiuma,* with a similarly elongated body and limbs that are mere rudiments. Illustrative of the mud-snake's adaptation to this type of food is the fact that captive specimens feed eagerly on *Amphiuma.* On one occasion a specimen of *Farancia* about five and one-half feet long easily vanquished and swallowed an *Amphiuma* twenty-seven inches in length.

The mud-snake may be detected occasionally by the keen eye of the nocturnal traveller along the Tamiami Trail, Florida, which runs from the Gulf of Mexico to the Atlantic south of Lake Okeechobee, through that immense primitive area known as the Everglades. On the southern loop of the Trail, forty miles west of Miami, is a veritable paradise. Nowhere else is there a more striking example of exotic garden beauty. Here Nature has garbed herself in her gayest and most enchanting robes. The cypresses are bedecked with long Spanish moss, and the butterfly orchid, *Epidendrum tampense,* nods gracefully in the breeze. The late afternoon sun, as it sinks into the west, casts long shadows across the Trail, making way for the magic touch of the tropical moon. I find this location to be a favorite habitat of the exasperatingly tame *Farancia.* These snakes usually are not inclined to retreat at the approach of an intruder, and thus present an opportunity for detailed study.

The mud snake is oviparous and selects a location for depositing its eggs where they will remain slightly moist during incubation. As many as thirty-five are laid in one nest, and the mother remains nearby, perhaps to protect them from enemies. But probably the main purpose is to make sure that the eggs do not dry out, for it is noteworthy that, although some species bring forth their young alive, and a few guard them with greater or less care during incubation, reptiles exhibit little parental solicitude. Upon emerging, the infant mud snakes have sufficient vitality to shift for themselves and carry on the life journey without further aid, as is the case with all our reptiles.

After this beautiful specimen has been exhibited to

GUARDING THE NEST
This is an oviparous species, depositing as many as 35 whitish leathery eggs in a moist location, and remaining to guard them until they are hatched

my interested friends it is my intention to restore it to its native home. Although the beauty and quiet habits of the species would seem to encourage its keeping in captivity, the matter of food constitutes a serious difficulty. Until recent studies disclosed its usual food, all attempts to confine the species failed, since the creatures could not be induced to eat. Even now, with its food preferences established, the drawbacks are by no means removed, because of the difficulty of procuring a sufficiency of the elusive amphibians that are its choice.

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Everything but Running Water *By* HOWARD CLEAVES

WHILE it is an exaggeration to say that house wrens might nest in your pocket if you stood still long enough, there are cases without number of nest-building by wrens in the pockets of old coats hung on porches or in sheds. On Smith's Island, Virginia, the lighthouse keeper draped some old clothes on a cross-shaped frame by way of making a scarecrow to keep the birds out of his kitchen garden. Wrens used the scarecrow's hat as a song perch and were busy carrying twigs into the sleeve of the coat through a hole worn by the one-time owner's elbow. That the twigs came out the bottom of the sleeve and dropped to the ground where a heap had already formed did not deter them. To take pictures I set up an umbrella blind a few feet away. As I stood inside, hand on the crank of the motion picture camera, one of the wrens came to investigate. Entering through an observation window, she alighted on my shoulder, then ran the length of my arm, and left by another window just in front of the lens. That was the only time I have ever been mistaken for a scare-crow, the wren evidently thinking me and my blind a second one suddenly arrived on the scene, and something not to be feared.

A WREN HOME IN A PORCH LAMP
Nesting material was closely packed about the bulb, which provided heat for the home

The photograph shows as odd a wren's nest as has come under my observation for some time. It occupies an old grill-work porch lamp at the summer home of Mrs. J. B. Lyon, Jr., at Selkirk, New York, a few miles south of Albany. The wrens have stuffed the lamp so full of twigs that the door, shown swung open, cannot be completely closed. The electric bulb in the center of the lamp couldn't be more tightly packed in a shipping box filled with excelsior. It is so closely surrounded by nesting material that its light barely penetrates to the outer world, as may be judged from the photograph, made by flashlight while the porch lamp switch was turned on. When the light is burning the nest is brilliantly illuminated and receives a considerable amount of warmth. Thus these wrens by their choice of location have light and heat—in fact, everything but running water.

Snow Covered Boulders and Aspens

A bit of winter pictured by A. R. Cahn, long-time student and recorder of Nature in her many moods. It was photographed in January, 1936, near Burntside Lake northern Minnesota. A heavy blanket of accumulated snow has been covered by a newly fallen coverlet that leaves a fresh page for wild folk to record their stories.

The Versatility of Ice

By C. F TALMAN

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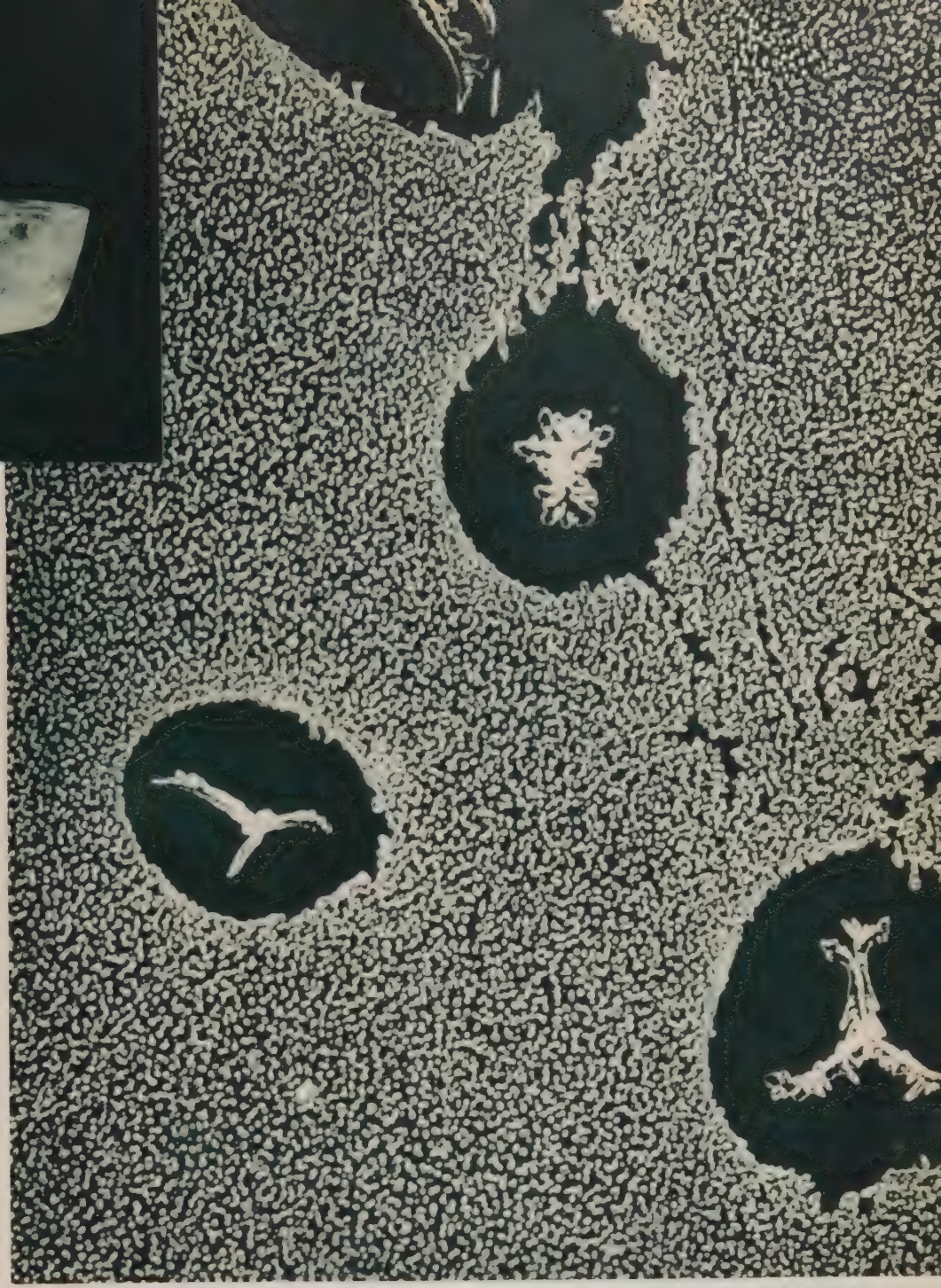
Ice is a mineral, and it is perhaps the most interesting of all minerals because of the endlessly varied forms of the crystals of which it is composed. Microscopic views of about 2400 different shapes of ice crystals are contained in the magnificent book *Snow Crystals,* published in 1931. They are from negatives made by the late W. A. Bentley and represent less than half of his entire collection of such pictures. Ice, which of course includes snow, also assumes an immense variety of interesting forms that do not require a microscope for their observation. Thus Nature's ice picture-gallery vies in diversity and beauty with her gallery of flowers.

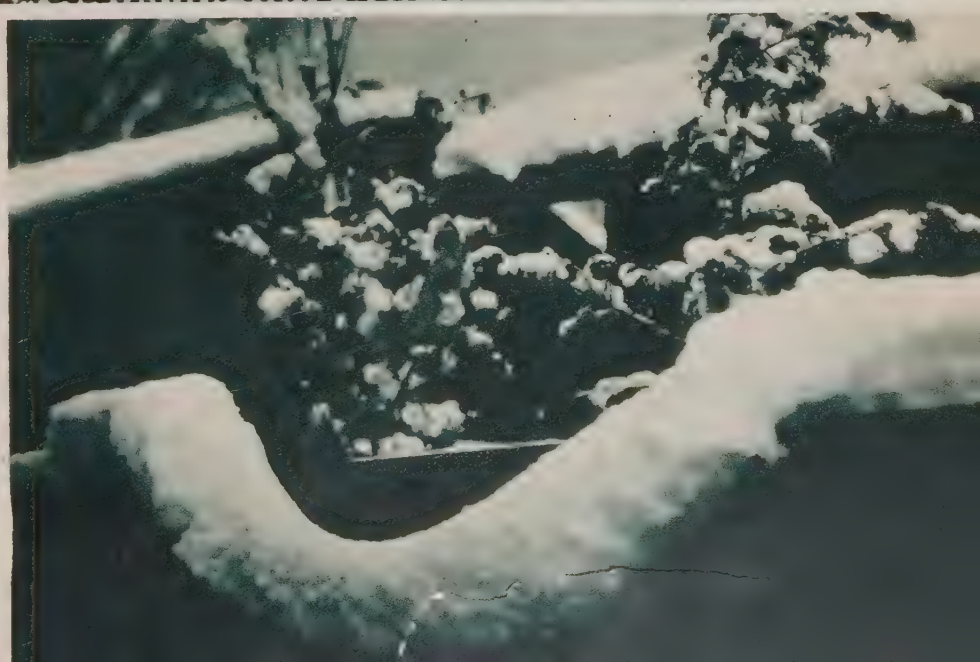
Unlike most other minerals, ice melts and evaporates at ordinary temperatures, and for this reason we cannot make a collection of ice formations. We can, however, collect photographs of them. There is no limit to the number of pictures such a collection might contain. The pictures here given are merely a supplement to the far greater number of those that have appeared in NATURE MAGAZINE from time to time in articles dealing with ice, hail, ice storms, icebergs, snow rollers, glaciers and the like. The photograph on this page, taken by F. S. Baker of the U. S. Forest Service, depicts the intense stillness of a winter morning after a snowstorm.



"Ice spines" were brought to the attention of the scientific world a few years ago by F. E. Matthes, of the Geological Survey, who found several specimens where water had frozen in small depressions in the rocks. If you will examine the ice in your electric refrigerator you probably will find one of these spines in the center of each. Photograph by J. K. Hillers, courtesy of the U. S. Bureau of Public Roads.

In cold weather, when the air is warm and moist indoors, window panes may become coated with tiny drops of water that later freeze into minute balls of ice. A microscope is needed to see these tiny spheres. Photograph by W. A. Bentley.

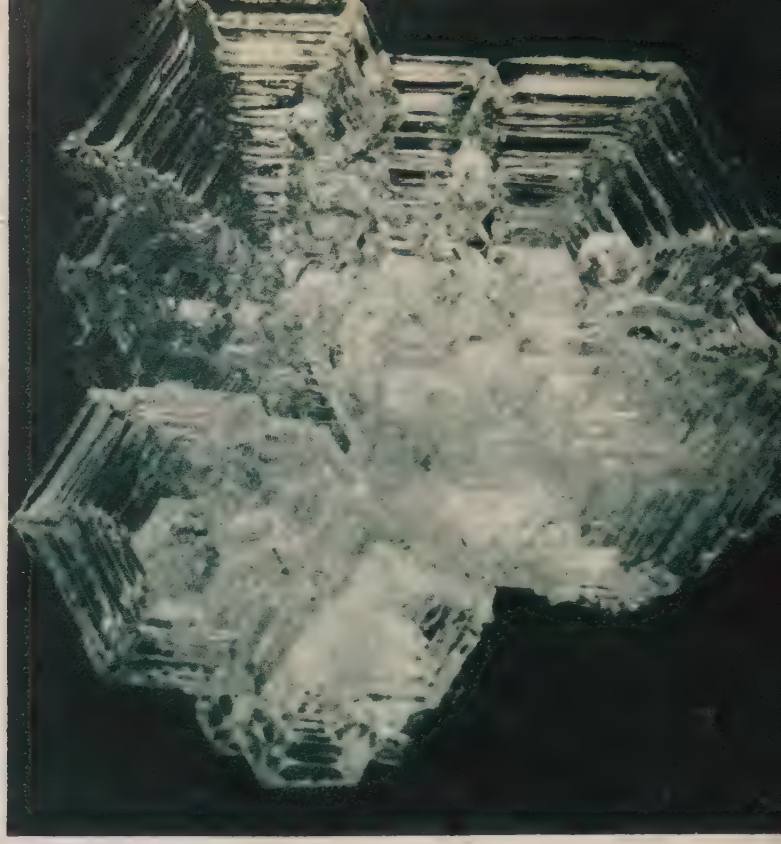
Nature is as adept in snow sculpture as she is in ice. One snow formation that borders on the miraculous is the "snow garland." This begins as a strip of snow lying along a window ledge or fence top. Eventually the strip slips down in the middle and hangs festoon-fashion, supported only at the ends. Photograph by S. Ohti of Tokyo.



The ice patterns on a frosted window pane are as beautiful as they are varied. Many of them, however, have a striking resemblance to ferns. Geologists must wonder if Nature, in her fern-like ice pictures, is not showing man how the ancient plants of the Carboniferous age appeared. This picture appeared in NATURE MAGAZINE several years ago, and is reproduced here because of its interesting design.

The pictures on the opposite page, taken by W. A. Bentley, reveal the many queer forms taken by frost on a window pane. At the bottom of the page is a picture of the pinnacled snow fields found in their greatest perfection in the Andes of tropical South America. Photograph by Juan Keidel.

Here is pictured a country scene that has been whitewashed by a winter fog. The quaint word *rime*, which the dictionaries tell us means hoarfrost, is applied in the scientific vocabulary to a rough or feathery deposit of ice crystals formed in cold weather by drifting fog. The water droplets of the fog are cooled below the freezing point and, on coming in contact with a solid object, instantly turn to ice. Photograph courtesy of the Alaska Railroad.



In the Kungar ice caverns of the Ural Mountains are formed large ice crystals, two specimens of which are here presented as recorded on the camera film by A. F. Wangenheim. They are hollow and six-angled and have a curious spiral geometric construction. Some are as much as eighteen inches in diameter.

The magnified view of hoarfrost on a blade of grass shows a type of crystal that is often found on plants after a clear, frosty night when the air contains a good deal of water vapor and the weather is not extremely cold. This formation consists of tiny hexagonal rods with bristle-like appendages at the angles. Many other types of hoarfrost are known to science. Photograph by W. A. Bentley.

Dog puppies have a certain personality possessed by no other animal. Their antics and mischief-making warm the heart of everyone who has had the pleasure of own-ng a young dog. These pictures were taken by Cy La Tour, who supplied us with the excellent dog portraits -hat appeared in the December rotogravure section. At the right is a pointer pup who is just beginning to get the smell of the field and woods in his nose and is obviously enjoying it. The young wirehaired fox terrier is at a loss to understand that clicking machine that the cameraman is pointing at him. At the bottom of the page, two Boston terrier pups discover for the first time that there is more to the world than the big box in which they were born, and they are eager to explore.

All spaniels are clever dogs with gentle dispositions, but the cocker spaniel is the little gentleman of the whole family. He makes an admirable pet for children because of his mild manner, and never tires of playing. Being exceedingly sensitive, the cocker can be punished severely with a rough word or a light slap on the muzzle. This breed has become extremely popular in the past few years, and has pushed up to fourth place in registrations. The three English setters pictured below are members of a breed having great scenting ability. The adult dogs are graceful of movement and have a posture that is decidedly aristocratic in contrast to puppyhood.

TRACKS in the SNOW

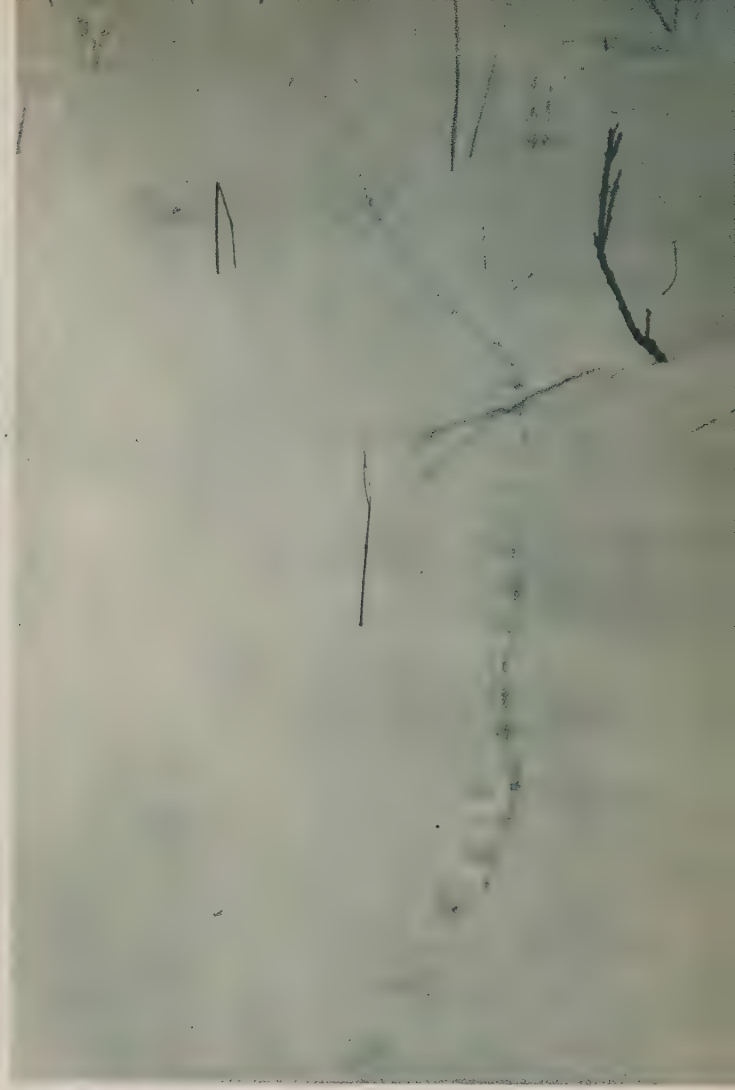
Nature's beauty changes, but does not fade with the coming of winter. Although the gold and red magnificence of autumn is gone, Nature only has wiped the brilliant colors from her landscape easel, supplanting them with a chaste white painting of modest beauty to contrast with the extravagance of the preceding season. It is this contrast that reveals the skill with which she wields her brush. A. R. Cahn has caught the beauty of a winter landscape in northern Minnesota. A varying hare, scampering across the glade during his nocturnal wanderings, has left the tell-tale trail that, could we follow it, would reveal to us the creature's food, enemies and friends.

The photographs on the following pages are by L. W. Brownell, who has chosen for his subject the tracks left by the many smaller creatures of the winter woods.

The bold track in the upper left corner, with the clear-cut mark of a sharp edged tail, shows where the muskrat has left his moated castle to take a walk.

Above, a white footed mouse has left the shelter of the deeper woods to seek his food of seeds and berries in a spot where he needs to keep a close watch, lest a screech owl pounce upon him.

A gray squirrel, although he finds the earth close-blanketed with fresh snow on this cold morning, has visited this scattering grove, hoping to find a few acorns to tide him over. One would think that such memories would prompt him to store away a winter supply as does his small red relative.



In the upper left picture, a muskrat has left his underwater retreat and has ventured out in search of food. Some source of alarm, perhaps the approach of the photographer, has sent him scurrying back to safety.

Although the short-tailed shrew keeps closely to his well-sheltered runway in summer, he is sometimes driven by the stress of the cold season to seek his food in unaccustomed places. In the above photograph we see evidence of his indomitable energy in pursuing his wanderings the night before, perhaps by the light of the moon.

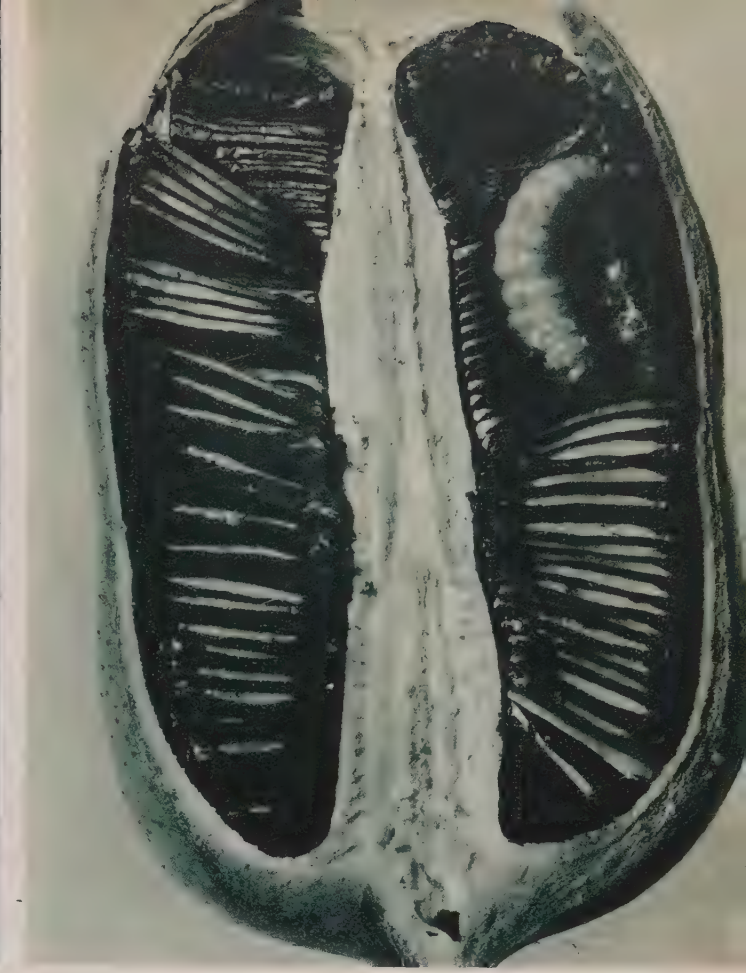
Even the most pampered house cat at times likes to yield to the hunting urge and to fare afield, sometimes miles from home. Perhaps a spirit of adventure more than the urge for food may be the call, for at such times tabby must consider the chances of meeting the wily fox or his wild relative the bobcat, either of which will gladly make a meal of him.

THE PARTNERSHIP

Photographs by Cornelia Clark

Yucca filamentosa, known also as Adam's Needle, grows in many sunny places in our southeastern states. Between this plant and a tiny moth, Nature has built up a friendship so close that each is essential to the other.

The moth, ***Pronuba yuccasella,*** is one of a number that befriends different species of yucca in our southern and western states. The female moth takes no food in the adult stage, so has no direct interest in the pollen or nectar. When laying her eggs, however, she deliberately collects the pollen from the anthers with her maxillary tentacle, which is a peculiar modification of her mouth parts that seems to have been designed for the purpose. She then deposits an egg within the developing ovary of the plant and then runs up the pistil and deposits the pollen in the stigmatic opening. When the egg hatches the larva finds itself among the seeds that form its sole food. As there are more seeds than are needed by the insect, the perpetuation of the yucca is assured.



When the larva has completed its growth it digs out of the seed case and falls to the ground where it burrows into the soil at the base of the plant, and, spinning a cocoon, passes the winter in the pupal state. Transformation to the chrysalis takes place in the spring about a week before the flowering time of the yucca. Thus the adult moths emerge just in time to repeat the process by which their ancestors, ever since they learned their lesson, have provided for the maintenance of their offspring by pollinating the flowers of the host plant.

Here are shown the eggs that the mother carefully inserts in the tissue of the plant for whose continued existence she has made provision, and one of her larval young, hatched in a seed pod that has been developing at the same time.

Below are the seed pods that split in three parts to release the seeds, and the pupal skins that remain on the ground at the base of the plant after the adult moths have emerged and have performed their final offices for the benefit of both their own species and the plant.

Tree Trunks

Our own American beech, which Thoreau says has the handsomest instep of any of the forest trees, may well be the first of this series of tree trunks, photographed by L. W. Brownell. The sturdy trunk is fitting for a tree that may live for several hundred years. The smooth, light gray, dark mottled bark invites the knives of those who like to carve their initials on a trunk that may carry them for several generations. The beech so shades its bed that scarcely anything can grow there, inviting erosion that here has disclosed the sturdy roots.

The bark of this veteran sugar maple, upper right, indicates that probably it has yielded its sap to please the palates of more than one generation of happy children.

Strength is evident in every line of this sycamore, with its massive branches that insure a crown that matches the promise of its straight even bole. On the upper branches the outer bark has peeled off, exposing the greenish-yellow inner bark so characteristic of this splendid tree.

What tree of our woodland buttresses so well its massive trunk and crown as the American or white elm shown above? Strength is written in every line of those great roots, reaching out to anchor to mother earth a bole that must support against summer and winter winds its lofty, widespreading crown.

The red oak is probably the best known and may be called the typical oak of eastern America. Its extensive range, its fragrant reddish wood, and its clean cut trunk with its massive branches make it a favorite. True, its fruit is less pleasing to the taste of man or squirrel than is that of the white oak, for example, but it bears so plentifully that many a wild creature owes its life to its acorns.

The flaky bark of this shagbark hickory has given this fine tree its name. The species is a favorite over many states both because of its excellent wood and especially because of the deliciousness of its nuts.

A dark, almost black bark with a yellow inner layer characterizes the trunk of the black oak, shown in the upper left picture, one of the commoner of our eastern species. While it is a beautiful tree, the wood is not especially valuable and is not highly esteemed. A yellow dye, called quercitron, was made formerly from its yellow inner bark.

While the white oak is named for its light-colored bark, one must look for certain subtle characteristics to be sure of the identity of the one pictured above, for it is mainly in the shadow. The acorns of the white oak, which develop the first season, are the sweetest to the taste of all our eastern oaks.

The pin oak trunk is so true to life that its tapering crown, its tough slender branches clinging to the trunk for years after they are dead, and the long slender catkins that fall in May come at once to the mind of those that know the tree. The name probably came from the fact that the pioneers used the tough wood of the dead branchlets for staples, or "pins," in framing their buildings.

★ Conservation ★

A section of Nature Magazine devoted each month to the expression of practical opinions on the vital issues affecting our use and abuse of natural resources, including wildlife, and dedicated to the purpose of assisting Americans to play a militant part in the attainment of constructive conservation aims.

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IT DOESN'T MAKE SENSE

Before reading this editorial may we ask that you turn to page 43 and there read the article entitled "Guarding the Columbia's Silver Horde" appearing under the signature of Frank T. Bell, United States Commissioner of Fisheries. You will find it a glib, well-written piece. Read by itself, its half-truths glitter as of pure gold. It is calculated to leave the impression that all will be well with the two hundred million dollar salmon run of the Columbia River. It is intended to indicate that the Bureau of Fisheries may be relied upon to see to that. Let us examine the facts.

First, to be sure, we find Mr. Bell admitting that the dams now under construction threaten the future salmon runs, and that if the fish do get past Bonneville Dam they will meet a final and insurmountable obstacle in the Grand Coulee Dam. This mass of steel and concrete five hundred feet high is now being reared, and no device has been proposed or any effort made to try to get the salmon above this obstruction. Yet Mr. Bell avers that the Columbia salmon are in no danger of extinction and that "the difficulties in the way of their successful migration and spawning have been foreseen and provided for."

How can we accept any such unsupported statement when we consider the fate of the teeming salmon runs that once ascended Baker River in Washington? This is what happened there. Following many years of successful effort by the Bureau of Fisheries to conserve these runs, the channel was blocked by a two-hundred-foot dam. For a time means were sought to permit the salmon to surmount this obstacle. None were found feasible, and the salmon are gone. The failure of Bureau of Fisheries' efforts to save salmon in the Sacramento River in the face of commercial developments also deserves study.

For the record, let's tell the truth about Bonneville Dam. It was up to the Bureau of Fisheries to demand sufficient funds to let the salmon by on their up-river trip and to care for the fingerlings on their way down. An utterly inadequate sum was sought, and, further, the Bureau actively opposed gravity fishways—a series of pools leading up and around the dam—in favor of untried and dubious fish "elevators". The Bureau officials preferred to gamble with a two hundred million dollar resource. It was only through a fight by the Oregon fish and game commissions, assisted by the commercial fishermen and many other organizations and individuals, that funds were obtained to build three gravity fishways. And after hearing the evidence of fish experts on one side and the Bureau of Fisheries on the other, the Army engineer in charge rejected the Bureau's recommendation, although two elevators will be tried experimentally in addition to the fishways.

As to the low dam at Rock Island built in 1931 by a private company, Mr. O'Malley, Mr. Bell's predecessor in office, although he actively opposed this dam as a menace to the salmon run, was overruled and a permit was given. He did, however, demand and secure plans for three fishways. Any delay in the construction of the three fishways may be laid at the door of the Bureau of Fisheries and not to the contractors.

When the plans were being made and the money was allotted for the building of the Bonneville and Grand Coulee dams the present administration of the Bureau of Fisheries was sound asleep. Its solicitude for the future of the Columbia River salmon run was restricted to a fanatical interest in the untried "elevators". It could hardly be expected that power developers and Army engineers would be concerned with or know about the fishery problems. The responsibility to fight for the salmon rested with the Bureau of Fisheries. It did not fight.

In the light of what has happened here, we believe that it is pertinent to point out that the United States Forest Service is headed by a forester; that the United States Bureau of Biological Survey is headed by a trained biologist; that the National Park Service is directed by a man who has devoted his life to the National Parks; that the Office of Education is run by an educator; and, finally, that the Bureau of Fisheries is headed by a political appointee and real estate promoter. It doesn't make sense.

THE WATERFOWL SITUATION

We note that the Biological Survey is still explaining how the 1936 regulations on the taking of waterfowl were justified by the facts, and will result in the building up of the present alarmingly depleted stocks, and how pitifully ignorant are those who believe that cessation of shooting for a season or more is necessary to be on the safe side. Frankly, we are sorry for those who think it necessary to justify conclusions that were dictated rather by politics than by facts. Politics is with us always, and it is no fault of either the waterfowl or the agency entrusted with their protection that an especially serious crisis in protection should come simultaneously with a Presidential campaign. These occur every four years, and four years is but a moment in the ages it takes to build up the numbers of a great group like the waterfowl. But when such a group faces the fate that now threatens it in America, where it has been declining for at least a hundred years, more or less steadily but with occasional accelerations in speed because of man's activities, each year becomes more and more vitally important. And in the realm of Nature election years are no more helpful, or inimical, than other years.

These thoughts come from a careful reading of an article under the above caption, written by a member of the Biological Survey, and published in Bulletin of the New York Zoological Society for September-October, 1936.

It is not now practicable to discuss in detail this paper, but it seems desirable to touch on a few high points.

In the first place it appears to be the theory of the Biological Survey that the waterfowl supply can be built up, in the face of continued shooting, by certain restrictions on methods and kill and by the building up of refuges in the United States. We believe that this program, born largely of political expediency, is inadequate to cope with the situation. Apparently the printing and sale of waterfowl stamps months in advance of the shooting season each year, and necessarily without any knowledge of the extent of the prospective supply, has become a settled practice. This custom virtually promises an open season, and it then becomes the supposed duty of the Survey to grant seasons that are as acceptable as may be to shooters in the different zones. These must be backed by the reports of investigations. In times like the present, when there was a widespread appeal of conservationists of many creeds for a closed season, an effort must be made to discredit those who seek such action. In the present case this is attempted by charging these "well-meaning men and women" with ignorance and hysteria.

There follows a survey of the continental breeding grounds and the effect on them of drought. There is nothing new of importance in these paragraphs, since they are based mainly on information that has been accumulating for many years, and which has long been at the disposal of those supposed victims of hysteria who appealed for a cessation of shooting. For example, we read: "There is reason to believe that even in their primeval condition, the far-flung nesting grounds of Canada and Alaska produced about 85 per cent of the waterfowl of North America. Under present-day conditions, even under a reduced abundance of the birds, it is more likely that this percentage has been increased rather than diminished."

Now, as we have said, this information has long been in the possession of those who advocated a closed season. And, since most of the waterfowl are raised north of the drought area, the realization of the importance of the vast northern nursery becomes the most important argument in support of their views. Then why have we not given the harassed waterfowl a respite, and let the salvaged legions go north next spring to raise their broods in the vast nurseries of the north, unvexed by drought or firearms, and teeming with food? And, we ask, how otherwise shall we restore to their heritage the ravaged waterfowl population? Surely not by attempting to establish a few thousand acres of refuges in that burnt-out, drained, drought-ravaged territory where, even in primitive times, only a part of 15 per cent of our waterfowl were hatched. Yet, in its zeal to defend its waterfowl restoration program, the Federal government places major emphasis on these relatively tiny refuges, and ignores the region that now produces practically all our waterfowl.

The appeals for a suspension of shooting did not come mainly from persons ignorant of conditions, nor from those subject to hysteria. The true conditions are well known to them. In fact, the patient labor of some of these very individuals is largely responsible for the picture that inspires their efforts to mitigate the devastating ravages of overshooting. And such disinterested champions of our tottering waterfowl resource cannot feel much encouraged by any such reports as this one, from an observer almost without previous experience in the great waterfowl nurseries of the sub-arctic: "Far north duck crop normal."

This last-minute message seems to have loomed large as justification for an open season. Such a statement means nothing. Many decades have passed since the duck crop of the Far North could be termed "normal". If "normal" means normal in comparison with conditions during recent years, it is no argument for continued killing. In short, the whole article seems to offer a discouraging prospect to conservationists.

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Conservation-minded readers of Nature Magazine who wish to be kept advised of special problems that arise between issues of Nature Magazine may have their names placed on a list to receive special conservation bulletins, information and calls to action. Just write to the Conservation Department, Nature Magazine, Washington, D. C. and ask to be placed on the special conservation list.

Guarding the Columbia's Silver Horde

By FRANK T. BELL

U. S. Commissioner of Fisheries

A NEW chapter is being written in the history of the age-old struggle for the mastery of natural forces. Man rides the winds, tames the lightning, harnesses the tides, struggles with floods, and now the subjugation of a hitherto untamed giant of waterways, the Columbia River, is about to become an accomplished fact. Once fettered, this mighty stream will make possible the realization of power and irrigation on a titanic scale. But man's victories over Nature are often won at great cost. As always when we change the face of the land, there arises the problem of protecting the wild life which is adjusted to the old, slow-changing order. The development of the Columbia River for power and agriculture imperils an ancient industry, the salmon fisheries, for its preservation depends upon the ability of the fish, migrating from the depths of the ocean, to reach the headwaters of the river to spawn. Now, across their pathway, are being erected barriers of steel and concrete and unless the fish are permitted to pass these obstructions, the Royal Columbia chinook will become only a memory of former grandeur.

In the shallow upper tributaries of the Columbia, spreading out over three states, are the principal spawning grounds for the salmon. Every spring and summer the adult fish leave the ocean and fight their way over rapids and cataracts up to these gravel-bedded streams. On their way they yield to thousands of commercial fishermen a harvest worth $10,000,000 a year. The parent fish never make the return journey but die after spawning. The young fish, after spending from several months to two years in fresh waters, return to the ocean. "Rivers are moving roads," and to the young salmon the Columbia is a mighty road which leads him down to his feeding grounds in the sea. After several years in the ocean where some species reach a weight of 20 to 30 pounds (and the chinook as much as 85 pounds) he, like his parents, will make the journey up the Columbia, returning to the very tributary where he was hatched.

Let us, with the mind's eye, follow the salmon as he emerges from his ocean home in the deep, blue waters of the Pacific to seek his mate on the sunny shallows of some tributary stream high in the Rocky Mountains. As he enters the mouth of the river, he must thread the mazes of the gill nets and seines of the commercial fisheries in the lower Columbia estuary. If he evades capture, he makes his way swiftly upstream. As he passes the polluted Willamette River he must swim through the murky, suffocating water pouring from its mouth. As some of the migrating salmon leave the main stream and ascend its tributaries they may find their path blocked by logs or the débris of logging operations. Where the banks of streams have been stripped of trees and underbrush, the waters, no longer protected from the sun, are too warm. In some streams soil erosion, following removal of the forest cover, will have washed out or silted over the spawning grounds. Ascending other tributaries, the salmon may find barren stream beds from which the

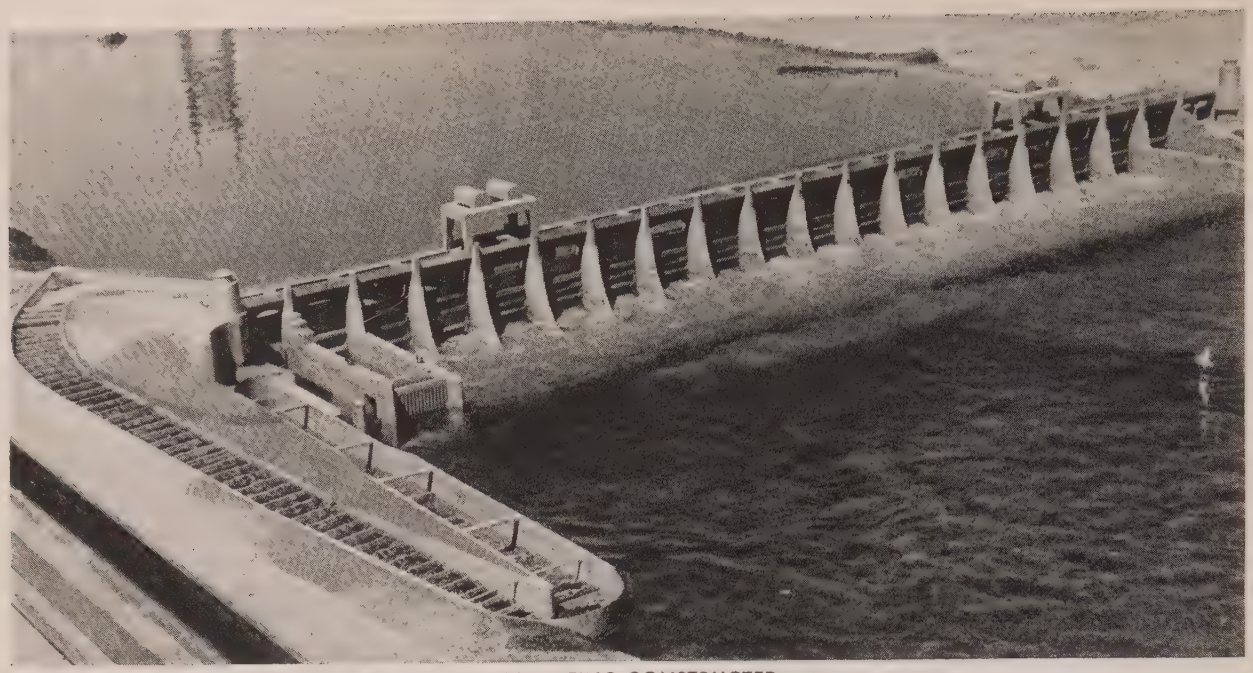
In the August, 1936, issue of Nature Magazine we published an article by William L. Finley entitled "Are Salmon Being Sold Down the River?" It dealt with the threat to the salmon industry of the Columbia River from the extensive damming of the river for power and irrigation purposes, and charged the United States Bureau of Fisheries with ignoring the future of this important resource.

Following publication of the article we received from Mr. Frank T. Bell, United States Commissioner of Fisheries, a letter describing Mr. Finley's article as a "partisan attack." He charged Mr. Finley, and ourselves, with entangling conservation with politics. And he enclosed an article which, he said, "will give your readers the benefit of knowing the actual conditions prevailing on the Columbia River." That article is published herewith exactly as submitted by Mr. Bell.

In publishing this we feel that we should quote from our letter in reply to Mr. Bell's charge of partisanship in which we said: "Our primary concern is conservation and what we regard as the wise administration of our natural resources. We have seen so many of these sacrificed to ill-advised and ill-considered projects during the past two decades and before, that we feel that nothing but a militant defense of those that are left is possible. We will make that defense, and level criticism, irrespective of partisan politics."

Further in connection with the accompanying article we wrote on October 5 to Mr. Bell asking for data showing the location of existing dams on the Columbia River and exact information as to provisions made for the escapement and passage of salmon up the river. This was acknowledged immediately by the acting commissioner, and the information was promised as soon as it could be obtained from the Pacific Coast. Up to the date of going to press—December 1—that information has not been forthcoming.

Also in connection with the accompanying article may we call attention to our editorial comment appearing on Page 41 of this issue?



MODEL OF THE SPILLWAY DAM AT BONNEVILLE, NOW BEING CONSTRUCTED

The model shows the fish trap and gravity fish ladder on the Washington shore. Two fish locks will be installed at each end of the dam. Photograph courtesy of the U. S. Engineer Corps

water has been diverted to irrigation canals. The majority of the run, ascending the Columbia itself, will not have encountered these difficulties, but others of an even more serious nature confront them. Although Nature has endowed the salmon with a store of energy to force their way up a thousand miles of the Columbia's channels, against the Gargantuan barriers of steel and concrete at Bonneville, at Rock Island, and at the Grand Coulee, they are helpless. Denied an opportunity to reach ancestral spawning grounds, the migrating salmon would die without producing the next generation and the most famous run of salmon in the world would be destroyed. Now above the tumult and roar of the machinery which is erecting these giants of civilization is heard the question, "How shall we save the salmon?—Or are they worth saving?"

No other food fishery in the United States outranks in commercial importance the salmon industry of the Pacific Coast. It is once and a half as valuable as all the oysters produced in this country. It is three times as valuable as the crab, and eight times as lucrative as mackerel, pilchard, and shad. The Columbia River is the primary salmon-producing stream of the United States. The following statistics from U. S. Bureau of Fisheries records for the year 1930, a typical year before the depression, indicate the magnitude of this fishery on the Columbia River proper, including a portion[1] of the troll catch taken from Columbia River fish while they are still at sea:

Total landings of fish, 32,347,000 pounds.

Value of catch to fishermen, $3,319,000.

Canned salmon, 426,644 standard cases.

Value of the salmon pack, $5,944,000.

Number of men employed as fishermen and at shore plants, 5,360.

Estimated number employed in related industries, 15,000.

Number of wholesale and canning establishments, 39.

Salaries and wages in these plants, $892,000.

Estimated value of fixed investments in shore plants, $5,000,000.

Estimated value of boats and gear, $1,000,000.

By adding together the various figures which can be considered rightly to enter into the estimated worth of the salmon industry on the Columbia River, it may be seen that the total value is about $10,000,000, which is equivalent to the interest on $200,000,000. The Columbia River salmon fishery is, therefore, a sizeable industry and represents a primary food resource that should be protected and fostered.

The steps that are being taken to protect the salmon are of sufficient interest and importance to merit their examination in some detail. Last year the Federal Bureau of Fisheries began an intensive investigation of the statistics of the fishery, securing records of operations of the commercial organizations from the earliest time in order to ascertain fully the trend of the supply and its present status. If our present suspicions are confirmed, it may be necessary to remove some of the seines and gill nets or shorten their period of operation in order to let more fish into the river to provide future years' crops. Then we must provide free access for the fish to their spawning grounds.

Affording a free passageway for the fish at the new Bonneville Dam within a hundred miles of the mouth of the river is one of the most difficult problems of this sort ever encountered. Never have structures of such magnitude been surmounted by such hordes of fish. The dam spanning the two channels of the Columbia on either side of Bradford Island will raise the water as much as 65

[1] 50% of troll chinook landed on Puget Sound and 75% of those landed on the Washington and Oregon coasts are included.

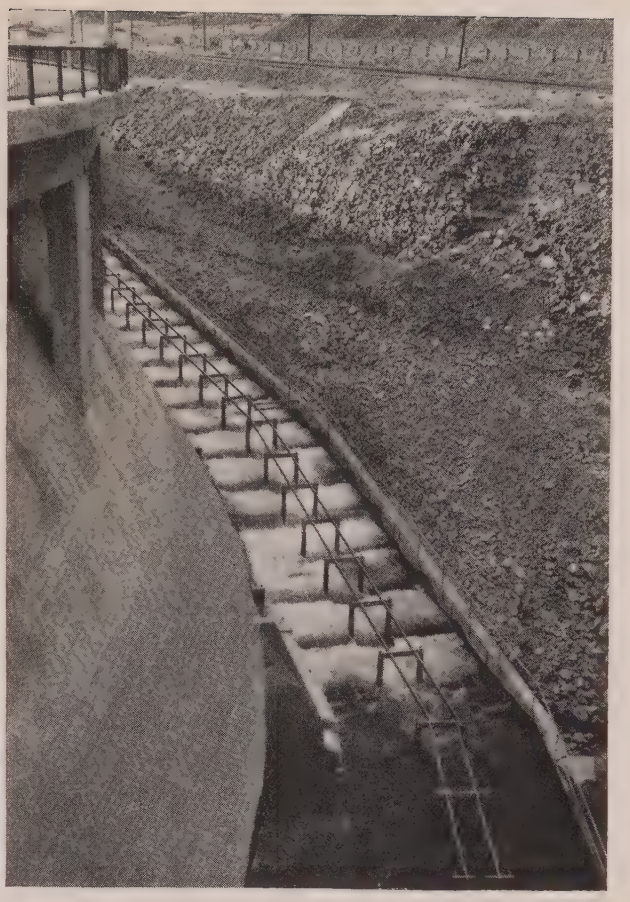
feet. The power house and ship lock in the southern channel during low water stages will require virtually the entire flow of the river when complete. During the next few years, however, when but two power units are in operation, 95% of the flow during flood stages will pass over the spillway dam in the north channel. During the height of the salmon runs 100,000 adult fish per day may seek to pass the obstruction. Any system of protection, therefore, must have capacity to accommodate the entire run in either channel. Engineering experience in other localities is of little assistance in solving our problem here. Hence, fishery protection at Bonneville will be frankly experimental, but the welfare of thousands of our citizens demands success.

Since October, 1933, the Bureau has employed the ablest biological and engineering skill available to conduct the necessary investigations and to design the fishways. Recommendations to the War Department presented by the Bureau, with the concurrence of the states, provide for three essential and inter-related structures for passing upstream migrants and additional structures for passing downstream migrants.

Space does not permit a detailed discussion of these plans, but it may be stated briefly that these are, first, a collecting system extending all the way across the face of the power house dam and smaller collecting units at each end of the spillway dam, provided with multiple openings by which the fish may enter the protective works wherever they encounter the obstruction. From the collecting system the fish may enter the second and third structures respectively; the hydraulic locks, like ship locks in operation, and thence to the upper water levels; or into gravity fish ladders patterned after the conventional designs of successful ladders now in existence. Augmented water supplied in the lower reaches of the ladder is an additional feature designed to make them effective at high water stages. By-passes for downstream migrants will be installed across the crest of the two dams to conduct the fish to gravity ladders at both ends of the dam and through the ice sluice at the power house. For these structures, the War Department's engineers have set aside $3,600,000.

Proceeding upstream, the next major obstruction in the Columbia River is the Rock Island Dam, built in 1931 by the Puget Sound Power & Light Company, near Wenatchee, Washington. This dam was provided originally with two gravity fish ladders, one at either end, which permit the fish to climb the 30 ft. difference in water level at this point. One of these is very efficient in passing large numbers of salmon, but the other, because of the position of its entrance, is less effective. Studies by the Bureau of Fisheries have shown that the dam offered a serious obstruction to chinook salmon which tended to congregate in a deep pool in the center of the river below the dam. At the Bureau's request in 1935 the Federal Power Commission ordered the owners of the dam to construct a third fishway, which has just been completed and is working effectively.

Reaching the Grand Coulee Dam in the upper river,



CLOSE VIEW OF A FISH LADDER
This one is installed at the low dam at Rock Island, enabling the salmon to pass around and up the river

the fish will meet with a final and insurmountable obstruction. The largest single structure ever built by man, the dam will rise nearly 500 feet above its foundations. No device has ever been proposed seriously to carry the fish over the dam either upward or downward. We are faced with the only alternative, then, of catching the fish that arrive and holding them until spawning time, artificially hatching the eggs, and returning the fry to the river. These may be returned to the river immediately below the dam, or runs normally reaching that point may be diverted by transplantation to favorable tributaries in the vicinity.

The spawning grounds of the salmon are in the upper shallow tributaries spreading out over three states. Deforestation and erosion, irrigation, and in some places mining, have made great stretches of these tributaries unsuitable for spawning. The Bureau of Fisheries is therefore conducting a stream survey of the entire Columbia River watershed to discover spawning areas that are now unoccupied by spawning fish because the runs to these streams have been depleted or obstructed by old logging and mill dams and thus destroyed; to discover spawning areas that could be made available by improvement of the stream bed and by removal of old obstacles; and to locate additional rearing pool and hatchery sites where opportunities are favorable for supplementing natural production by artificial propagation and as a basis for conducting transplantation experiments.

A SALMON JUMPING KETTLE FALLS

Here the Indians catch a few for food using suspended baskets like that shown at the right

With the increased use of the Columbia River and its tributaries for water power and irrigation projects, artificial propagation of fish will have to be employed to a greater and greater extent. Artificial hatching, however, should not be substituted for the natural propagation of the fish where it is possible to provide for the latter. It should be used only in case of necessity and as an additional means of maintaining or increasing the productivity of the spawning areas.

Now let us follow the young salmon on their migration to the sea. It is the young salmon's natural instinct to follow the downstream current, for through countless ages this has led him to his rich feeding grounds in the sea. The irrigation canals in many rivers, and particularly at low stages of river flow, divert a high percentage of the water to irrigate many square miles of orchards and farm lands. Countless numbers of fish following the laterals are stranded on the fields throughout the summer or left in canals to dry up at the end of the season.

For several years the Federal Bureau has studied means of effectively screening these irrigation diversions to prevent this loss. The problem of keeping two- and three-inch fish out of a canal 60 feet wide and carrying as much as 1,400 second feet of water presents engineering problems of considerable difficulty. The Bureau has installed rotary, self-cleaning wire screens of a type that has proved very effective. The largest diversion yet screened is the Sunnyside Canal on the Yakima River where a screen 80 feet long, consisting of eight 10-foot screens, 10 feet in diameter, has operated successfully during the last season. The cost of this installation was about $19,000. If electric screens can be developed to a practical stage, they should be constructed at a fraction of this figure.

State laws require the owners of irrigation diversions to screen their ditches to protect fish life and Washington is assisting by screening some 200 diversions with W.P.A. funds. Until 1934, however, when funds were provided by the Public Works Administration, the Federal Government had never discharged this obligation on its own projects.

Assuming that the fish escape the dangers of alfalfa fields and orchards, they must then be conducted safely over the great dams that span the river in its lower reaches. I have mentioned the plans for protecting downstream migrants at the Bonneville Dam by the construction of fingerling passes. It may be necessary to protect them also from the power turbines. This is an important problem which has not been overlooked in the Bureau's investigations on the subject, but the answer has not yet been given. Preliminary experiments indicate that fingerling fish may safely pass the type of power wheel that will be installed at Bonneville, for the smallest opening they will encounter in the power house is some 4 x 11 feet, and the propeller type of turbine to be installed will revolve at a rate of only 75 r.p.m. If future experience shows that the fingerlings are injured to any appreciable degree, it may be necessary to screen the draft tubes and force the fish to follow the fingerling passes around the obstruction. Since virtually the entire flow of the Columbia River at low stages will pass through the power house when it is fully developed, this will be a task of considerable magnitude. It is for this reason that the Bureau is conducting further experiments with the hope of perfecting an electric screen which can be successfully ap plied at Bonneville.

I believe you will agree with me that multitudinous problems are presented in protecting the fisheries of the Columbia River. In 1934 Congress provided the Bureau of Fisheries with an appropriation of $25,000 for the first year's work on a 10-year program of investigation of this watershed and this work has been continued. To summarize, the project involves (1) the devising of practical and effective regulations of the commercial fishery in the lower river to assure an adequate escapement of spawning fish; (2) the assurance of ready migration to the spawning grounds (adequate fishways at dams); (3) the removal of obstructions and the improvement of river beds to extend natural spawning areas and to rehabilitate those now unproductive; (4) artificial propagation to supplement natural spawning and to establish runs in tributaries that are now barren or that have been depleted; and (5) assurance of safe return of the fingerlings to the sea by screening all the irrigation projects and power houses that now prove a menace to the supply.

Such are the varied aspects of the Columbia River problem. Every phase has received careful study before being assigned its place in the well integrated plan. A valid biological or engineering principle forms the basis for every step which has been contemplated or taken. Contrary to the impression created by certain self-constituted critics who, although uninformed as to the true situation, have aired their pessimistic views in the press, we have no reason to believe that the Columbia

River salmon are in danger of extinction. The difficulties in the way of their successful migration and spawning have been foreseen and provided for. By the program of careful and intelligent planning which I have outlined, we feel confident that the preservation of the great national resource of Columbia River salmon is assured.

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Rich Land, Poor Land—A Book to Read

RICH LAND, POOR LAND by Stuart Chase comes under the head of required reading. We wish that this book might be a text in every high school in America. And we make that somewhat sweeping statement because Mr. Chase devotes himself to the theme that North America "has given us much and will give us more, if we work with her. But if we continue our neglect and contempt for her land and waters, she will exact a calamitous penalty, and all the laboratories, all the machines, all the banks, will not offset it."

Mr. Chase etches a picture of the primeval continent, "rich with growing things, incredibly beautiful to look upon . . . and perhaps the most bountifully endowed by Nature of all the world's continents." Now we look upon a land from which "the old forest, the old grasslands have almost completely disappeared. Desert lands have broadened. A dust desert is forming east of the Rockies where firm grass once stood. Woodlands—and a spindly lot they are by comparison—cover only half the area the primeval forest once covered. Grazing areas are still immense but the old types of native grasses have largely gone."

So far as the information in this volume is concerned there is little that is new. What is important about the book, however, is that never before has this information been so well organized, or translated into terms so intelligible to the average citizen and presented in a style that makes fascinating as well as alarming reading. Such sentences as "The skin of America has been laid open" give a vitality to a subject usually heavily and uninterestingly treated. We must pause to think when Mr. Chase says:

> "One is not disposed to quarrel with the exploitation of any part of Nature if it contributes to human welfare. *But one wants to be sure that the exploitation throws no boomerangs.* Welfare, after a fashion, has been served in the past by ravaging Nature. The boomerangs are now returning thick and fast. The continent is becoming not only seriously unbalanced in natural terms but rapidly inadequate for man himself. . . Advances in technology have kept ahead of resource decline until very recently. The depression dramatically uncovered a series of blighted areas where the resource base, considerably to our surprise, had disappeared."

And then:

> "Mr. Ford was right. However clever industry may be, the land, in its broadest sense, is the determining factor in the end. When new laboratories stand on every block and have solved every problem put to them, man will still be a creature of earth, living by sufferance of forces which he can adjust to a degree, but which he cannot ignore."

We could quote many more significant paragraphs and sentences from Mr. Chase's book. Space does not permit and the book should, after all, be read in its entirety, with the realization that, as the author says, "land, waters and wildlife are all part of one organic whole. One must be a kind of whirling dervish to tell the story, or a mathematician dealing in five or six dimensions simultaneously. A plain author using common language can simply do his best." Mr. Chase has done a splendid "best."

Rich Land, Poor Land is published by Whittlesey House, New York, and sells for two dollars and fifty cents, a modest investment in knowledge about our country.

R. W. W.

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CHRYSLER AND WATERFOWL

WE DO NOT suppose that the fine recently paid by Walter P. Chrysler for violation of the regulations protecting waterfowl will result in any substantial increase in the prices paid by purchasers of motor cars. Mr. Chrysler, with twenty-five other more or less prominent persons, was charged on October 15 last with violating certain regulations of the Migratory Bird Law, based on the treaty with Canada. The specific charges against Chrysler included shooting over baited waters and without a Federal duck stamp, and using a repeating shotgun of more than three-shell capacity. The offence was committed in December, 1935, in Dorchester County, Maryland, where Mr. Chrysler has a country estate. The accused persons appeared in court on October 27, in compliance with a court order, and here Mr. Chrysler pleaded guilty to the charges and paid a fine of eleven dollars.

It may be surmised that neither the size of the fine nor the prominence of the defendant, severally or in combination, can be wholly responsible for the interest in this case. Violators of hunting regulations are not confined to any particular social stratum. We have the word of no less an authority than J. N. Darling that, in the sportsman-waterfowl game, "no holds are barred." One may go the limit, and beyond, "and still be accepted in good sportsmen's society." But the present case has attracted more than its share of attention (perhaps more than it deserves) because Mr. Chrysler was the first chairman of the Board of Trustees of the much advertised American Wildlife Institute, with the slogan "The Sportsman's Dollar for the Sportsman's Benefit." We understand that Mr. Chrysler, although still on the Board of Trustees, is no longer chairman.

Some people may wish that less publicity had been given to this particular case. Others will be disappointed to find evidences of unsportsmanlike ethics in one occupying so high a position in both business and conservation circles.

The Degree of P. S.

By STEPHEN HAWEIS

THOSE who go out to raise money for worthy causes in the arena of life are comparable to the retiarius who, armed with a net, attempted to entangle the gladiator with shield and sword. Before the great Emperor of Nature I stand at the salute: "Hail Caesar, we who are (almost) about to cry, salute you!" If I secure my victim with one plunge of a fountain pen on a dotted line, I believe a famous parrot will be saved for posterity at no great cost.

There are, in the West Indies, four rare parrots that are in grave danger of extinction—those of St. Lucia, St. Vincent and two in Dominica—*Amazona bouqueti* and *Augusta imperialis.* It is principally on behalf of the latter that I am endeavoring to learn the art of the net-thrower. The last two are peculiar to the island of Dominica. *Bouqueti* is a large green parrot with a rose collar and a splash of red on the shoulders; *imperialis* is much larger. It is green also, with a purple breast and a bronze-brown tail. *Bouqueti* is still fairly numerous but *imperialis* probably inhabits no more than four miles square of the earth's surface. Legislation has recently made it a misdemeanor to own or sell *Augusta imperialis,* but both parrots are still shot by natives who devour them in the secret places of the forest.

Government land about Mount Diablotin costs $2.50 an acre and here I hope to establish a parrot reserve; two hundred acres patrolled by a keeper who would make it his business to feed and tame every parrot in his bailiwick. His mere existence would put an end to the shooting. A rough, rat-proof shelter should be built and as many parrots caught as possible. They should be confined in small cages until tame—a matter of about three weeks—and then released. This would ensure their staying in the neighborhood of their shelter and under the keeper's eye. I do not doubt that where they received intelligent protection they would most readily build their nests.

At present the habit of both birds is to travel to certain districts at certain seasons in search of particular foods. This, in a state of liberty, they could still do but my guess is that most of them would choose to remain near the abundant food-supply. Parrots are wonderfully human in some ways. Of course both species would come to the feeding station and both would be welcome. The cost of feeding them all would be small. The most difficult thing would be to find the right "Father Divine" for the reserve. The right man can be found with a little care and an educated supervisor for him could be found without additional expense. For keeper we do not require a white-collar man but a simple woodsman who lives in and knows the forest, and loves birds. We could have him for $7.00 a month.

At present the law prevents the capture, sale or export of the bird, but I believe the Government would favor an organized protection of it and permit the sale of parrots to zoos and responsible persons at a fixed price, half of which would go to the Government as a tax. It might even consider renting the necessary land on a long-term lease at a nominal fee. It is desirable that the Government should profit because that would ensure a more enthusiastic support from the police and every Government agent and official. The matter is already under favorable consideration in several private quarters but the opportunity is still open to anyone to make the final stab with a fountain pen and receive the honorable degree of P. S.—*Psittarum Salvator,* the Savior of the Parrots, or words to that effect.

BOB-WHITE IN WINTER

THE NORTHERN BOB-WHITE'S WINTER TERRITORY, by Paul L. Errington and F. N. Hamerstrom, Jr., is issued as Research Bulletin 201 by the Agricultural Experiment Station, Iowa State College of Agriculture and Mechanic Arts. It is based mainly on studies of this delightful bird carried on by the authors through six seasons in Iowa and Wisconsin. Pertinent and reliable data from many other sources are also utilized.

The authors conclude that a given tract of land is capable of wintering a rather definitely limited quail population even under good weather conditions. Given such a population, with suitable food and cover, the loss from predators is light, rarely more than six percent through ninety days. Thus: "pressure of native enemies is unlikely to be sufficiently severe to reduce healthy, well-fed wintering bob-white populations below the carrying capacity of the land."

The report, which contains about 140 pages, should be considered carefully by anyone interested in the bob-white, whether as farmer's aid, song bird, or for sport.

WOMEN LEAD THE WAY

THE WOMEN of the United States have always been leaders in conservation. In Wisconsin, women's clubs and other forward-looking groups, mobilized by Mrs. Edward LaBudde, paved the way for a conservation education law that provides for the teaching of conservation in state colleges and county normal schools. Now, from Michigan, comes word that the *Detroit News* will start a conservation column for women as a special weekly feature. Albert Stoll, Jr., conservation editor, is taking this step because he realizes that "the women of Michigan are becoming an important influence in the conservation program of this state."

Mr. Stoll said that the column will be written by a woman staff writer and will contain reports of conservation activities among women's groups throughout the state. "Women are exerting a strong influence in our conservation affairs," he said, "and their interest and activities along that line are beginning to command our special attention." Mr. Stoll's conservation page, appearing as a regular weekly feature, was an innovation among Michigan newspapers when it was introduced some years ago.

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The Michigan Department of Conservation also announces that conservation programs have been broadcast weekly over station WKAR at Michigan State College, East Lansing, since October 14. The broadcasts are conducted by George Egbert of the education division of the department. A cross-section of conservation activities is presented, as well as news reports and comments from women's conservation organizations, Audubon societies, and other groups active in the conservation movement.

RECENT ORNITHOLOGICAL MEETINGS

By EDWARD A. PREBLE

THE 54th Annual Meeting of the American Ornithologists' Union was held at the Carnegie Museum, Pittsburgh, Pa., October 20-22, 1936. Immediately following, October 23 to 27, occurred the 32nd Annual Convention of the National Association of Audubon Societies in New York City, its lectures being given in Roosevelt Memorial Hall, in the American Museum of Natural History.

The total number of papers on the A. O. U. program was 59, most of which related to habits, migration, distribution, classification or photography of birds. Almost without exception these papers were of outstanding merit, and in a few, mainly classed as distributional, attention was called to the diminishing frequency of nesting of certain threatened species within their former ranges. Papers with a decided conservational trend included "Proposed Fellowship Researches Involving Preservation of Threatened Species", by John H. Baker, elsewhere referred to in this issue; "The Great White Heron in 1936", by Alexander Sprunt, Jr.; and "Effect of Mosquito Control on the Ecology of Salt Marsh Birds" by William Vogt. The Committee on Bird Protection presented at the opening session its report, which we hope will be published in *The Auk*.

It was a disappointment to many that so few papers dealt with conservation. It must be remembered, however, that the American Ornithologists' Union was founded in the days when conservation was almost unheard of, and its need little realized, and that, as an organization, it has been slow to gain new viewpoints. As a result few papers on conservation find a place on its programs.

Nevertheless, preservation of the objects of its study would seem to be an eminently proper objective for any scientific society, and we believe that a majority of the A. O. U. members are really interested in true conservation. This fact is evident whenever one mixes with an informal gathering of members, and was especially exemplified on the field trip on October 23. Here was shown graphically the response given by waterfowl to protection. By damming a meandering swamp-bordered stream, on the Ohio-Pennsylvania line about 40 miles south of Lake Erie, Pymatuning Lake, a large irregular body of water eminently suited to waterfowl has been created. Here were gathered several species of ducks in loose flocks that were estimated to aggregate upwards of 15,000 individuals. Most of these were on the part of the lake that constitutes an inviolate sanctuary, and here many birds, notably mallards, were so tame that they would take food from one's hand. Flocks containing various species fed and dabbled within a hundred yards of the interested ornithologists, crowded beside their cars along the roadway that crosses an arm of the flooded swamp. On the other side of the road lies the part where hunting is allowed, and here only a few birds were seen.

In the main Audubon party that went to Cape May, New Jersey, on the morning of October 24, were about 60 enthusiasts, and numerous others went by private auto or by train. That afternoon and night and Sunday forenoon were spent on and about the Witmer Stone Sanctuary, the story of which is told in *Nature Magazine* for March, 1936. The two days' observations by the combined party revealed the presence of nearly 120 species of birds, including such relatively rare species as the barn owl and the raven, the first a bird that was formerly slaughtered by the wholesale on this area, and the latter perhaps never before detected at this point. Here for many years migrating flocks of hawks, owls, woodcock, flickers and other large birds were subjected to slaughter as they rested for the long flight across Delaware Bay. Now the sanctuary not only reduces the area subject to this outrageous treatment, but its presence has resulted in the closing of adjacent plots under private ownership, and has helped to foster a more rational viewpoint among the residents.

Addresses presented at the Audubon Association sessions on October 26 and 27 were many and varied. The subjects included educational efforts as a part of the training of Camp Fire Girls, Boy Scouts, 4-H Clubs' members, students at Nature Camps and educational organizations generally; and wildlife conservation conducted by the Biological Survey, Forest Service, National Parks Service, Soil Conservation Service, Bureau of Indian Affairs and the Izaak Walton League. The papers were wide-ranging in subject and well presented. Those familiar with the current tendency of Federal units to over-emphasize benefits that wildlife receives from their operations were not surprised at the one-sidedness of some of these addresses. Other papers by members of the Association staff emphasized the dire effects of anti predator prejudices, the serious effects of which are becoming increasingly apparent on many of our larger non-game birds. Discussion brought out the fact that the administration of certain regulations of the Migratory Bird Treaty Act by the Biological Survey, particularly that allowing the killing of fish-eating birds, is becoming more and more difficult, with corresponding serious consequences to many beautiful and desirable species.

Most of the papers presented can probably be obtained in some form from the organizations mentioned.

FOLLOWING NATURE'S TRAILS

By HEATHER G. THORPE

Science Guide, Buffalo Museum of Science

PHOTOGRAPHS COURTESY BUFFALO MUSEUM OF SCIENCE

AN OUTDOOR MUSEUM INCREASES KNOWLEDGE OF NATURAL HISTORY

The enormous popularity of the Buffalo Society of Natural Sciences' first open-air museum necessitated the construction of a mile-long Nature trail. This is the trail's Indian Garden, where grow many plants whose medicinal value was known to the North American Indian

HAVE you ever wished that you had a friend to tell you the names of plants growing along the wayside when you were out hiking or strolling through the park? A Nature trail will solve this problem, for as you walk down a Nature trail you have with you a friend well versed in natural history lore. He is a very obliging friend, too, and his store of knowledge seems inexhaustible. Always at your side, he is ready to give you just as much or as little information as you are willing to accept. This friend is the Nature trail label, the science guide of that outdoor museum, the Nature trail.

Perhaps you are unacquainted with Nature trails. This is not strange. Although communities have been labeling trees in parks and commons for many years, the real modern trail is new. An experimental trail was first developed in Allegany State Park in 1921.

The Buffalo Society of Natural Sciences conducts a summer school and camp in the forest of Allegany State Park, eighty miles south of its building, the Buffalo Museum of Science. One of the early attempts to add attractiveness to this camp resulted in an outdoor museum, intended to be a focal point where something of the natural history of the forested park area could be learned in a popular way. It was planned, therefore, for those visitors who might want to know the names and habits of the plant and animal life which surrounded them.

Ephemeral exhibits of plants in their respective blossoming seasons were set up each week. To furnish them with suitable containers, the camp kitchen was raided of such glassware as pickle and olive bottles, and the resulting show was instructive, if not uniformly neat and beautiful.

This museum was housed in a tent of considerable size, an open-sided affair with a table extending down the center. Here, in addition to plants, were placed snails, millepeds, insects, frogs, toads, salamanders, turtles and snakes native to the park area. All specimens were shown alive insofar as it was possible to do so. Professor William P. Alexander, naturalist of the staff of the Buffalo Museum of Science, was in charge.

Soon the response to this open-air museum became literally overwhelming. Its fame quickly spread over the countryside, and citizens far and wide, rural folk in particular, flocked to the Buffalo camp to see the collection gathered together in the tent museum. After a time it became apparent that something would have to be done to take care of the Sunday crowds which regularly swarmed over the camp grounds. Therefore, Professor Alexander moved many of the non-perishable exhibits such as rocks, fossils and the like, out among the surrounding trees. Eventually he began labeling the trees themselves as part of the exhibit. Then one day the thought came to him that a trail starting at the museum and leading into the woods could be broken and every-

THE FERN GARDEN

A popular part of the Nature trail, more than thirty species have been labeled in one of these beautiful spots

thing of a natural history interest could be labeled along the path. In other words, the idea was to lengthen the tent out a mile or more, extending it into a sylvan museum, no wider than a path!

The next day, with the aid of a party of enthusiastic campers, the first Nature trail was cut through the forest. Trees, shrubs and other woodland plants were labeled where they grew. Along the trail, perched on rocks, logs and stumps, pickle bottles could be found, each containing some lowly creature of the woods, and under them were labels telling the trail seeker something of the habits of the little fellows thus temporarily confined.

The first Nature trail was a vast success. Other trails in various localities have since been made with lavish embellishments and extreme refinements, but none, it may be fairly said, have better served the purpose for which they were made than did the first crude effort in the Allegany State Park.

The expansion of the Nature trail idea received great impetus when the city of Buffalo was about to celebrate its centennial a few years ago. Three hundred years ago the Indian's longhouse was the only permanent home to be seen in this locality. Dense forests covered all the land about the eastern end of the Great Lakes. War canoes of elm and lighter ones of birch or elm bark were the only means of water transportation, while Indian runners bearing tally sticks and strings of wampum beads formed the only other means of inter-tribal communication. In order to preserve for the future some of this Indian lore, it was decided that the laying of permanent Nature trails around the city would be most fitting. At the same time it was thought that in this manner pleasure would be given to the greatest number of people. Six organizations were invited to share in the project: the Girl Scouts, the Girl Reserves, the Camp Fire Girls, the Allegany Field and Trail Club, the Woodcraft League and the Boy Scouts. By each of these a trail was completed and maintained.

Have you ever been on a treasure hunt? The Nature trail has much the same element of surprise. Always there is that tantalizing label just a little farther on; always there is the knowledge that just around the corner some delightful surprise is in store. Indeed, you need never fear that you will get lost on these trails for they are always well marked. At the beginning there is the large master label which explains the purpose of the trail and invites you to follow it. This may take the form of a beautifully carved totem pole such as the Woodcraft League decided to use. In the words carved thereon, you are invited to "Seek the joy of being alive. Tarry awhile among these God-made things. . . . Heaven is under our feet as well as over our heads. Seek, and ye shall find it."

No Nature trail label is ever cut and dried. True, they do contain scientific names because we feel that people like to try to pronounce them, and students appreciate their significance. One of the best compliments received about the Buffalo trails came from a young couple who said that they enjoyed the trail because the labels were so "human". Perhaps they referred to the one that asks you to "meet the Honeysuckle Twins! The two flowers which appear in May at the end of each flowering branch will help you to identify this shrub. No medicine man's kit was ever considered complete without its berries."

Another label about the shrub called the Hercules' club also illustrates this point, for it reads: "The Indians

THE INDIAN GARDEN ENTRANCE

A family group finds its Sunday walk in the park more interesting, thanks to the Nature trail

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prized this shrub very highly for its medicinal powers. Oftentimes the Red Man had a 'heap-big stomach-ache' due to the tough meat he consumed and the berries of this shrub were eaten as a digestive aid."

Sometimes the labels ask instead of answer questions. One says: "Do you know what flower blooms after all others are dead and gone?" It then invites you to lift up the label to find your answer on the other side.

In addition to the shrubs and trees many other things also are described on a Nature trail. Have you ever seen a pin cushion of moss? Can you start a fire when camping in the rain? What is kinnikinnik? What is this dainty flower that the Indians used for their war paint? Nor are these labels confined to plant life alone. Several trails have wild bee trees growing beside them with labels calling your attention to "the real golden treasure, not buried, but far aloft." Papa Woodchuck's hole also comes in for its share of attention and from its label one learns something of this creature's habits and preferences.

While no two trails are ever just alike, each one has three special features, called gardens or pockets. There is the Indian garden, for instance, where gathered together and growing in a small space are some of the plants which the Indians found useful in this region. A great many of them he used for food and medicine but there are some others that he believed brought the bearer good luck or whose magic was strong enough to drive away the headless creatures, stone giants and other evil spirits that he believed surrounded him. Much of this lore has been lost to the white man but he finds the labels a fascinating study. He learns that cat-tails contain in their underground rootstalks a core packed full of starch that the Indians made into flour, and that for itching scalps there is nothing better, according to the Indians, than dried and pulverized plants of the pretty little wood betony, also known as lousewort for this very reason.

The Indian garden is always a spot of great beauty, with winding paths marked off by large rocks and stone steps leading down to a cool, shady glen, or situated by the side of a woodland stream trickling over the mossy limestone rocks in a series of small rapids. Here is also to be found the faithful friend of the old herb doctor, the blue vervain, whose healing virtues and miraculous powers date back to ancient Rome. Wild ginseng, pokeberry, Seneca snakeroot and bloodroot also have their places in the Indian garden.

Another feature of a Nature trail is the fernery, cool, dark, moist and good to look upon. It was once believed that when the spores of ferns were worn about the person, one could walk invisibly. What stores of potential invisibility there must be in these fernery pockets! Many years have passed since Shakespeare wrote "We have the receipt of fern seed. We walk invisible."

As many as thirty-two species of ferns have been labeled and described in one of these delightful spots. Most of them have been transplanted from miles around, yet one would think that they were indigenous. Do you wonder then that the Nature trail label, quoting from a poem by Professor Alexander, says:

> "Let me to the woodland turn
> Where the shades grow deep and deeper
> Here a star flower, there a creeper
> And everywhere the verdant fern."

The third feature shared by every trail is the wild flower garden, a naturalist's paradise of rare and unusual plants that have been brought from far away. Most of them have flourished in their new homes, which speaks well for the loving care that has been lavished on them. Here are found pitcher plants, those ogre-like flowers whose hollow, pitcher-like leaves become death traps for unlucky insects. Here, too, you will find round-leaved violets, earliest of their clan to bloom in western New York, together with purple-fringed orchis, moccasin flower, trailing arbutus, early saxifrage, shin-leaf and many others. From such a list it can be seen that various soil conditions and habitats have to be simulated. This is only one of the interesting problems attached to the making of a Nature trail.

Since the time the Buffalo trails were planned and laid out, the idea has spread. It has become popular for summer camps, and counsellors in charge of natural history have devoted entire summers to the making and maintenance of similar trails near their camps, for children find it an easy way to learn the A. B. C.'s of Nature study. Owners of country estates have also adopted the idea and find that it not only greatly enchances the beauty and value of their property but also adds to the enjoyment of their guests, agreeing with Elizabeth Barrett Browning that

"Earth's crammed with Heaven and every common bush
afire with God,
But only he who sees takes off his shoes."

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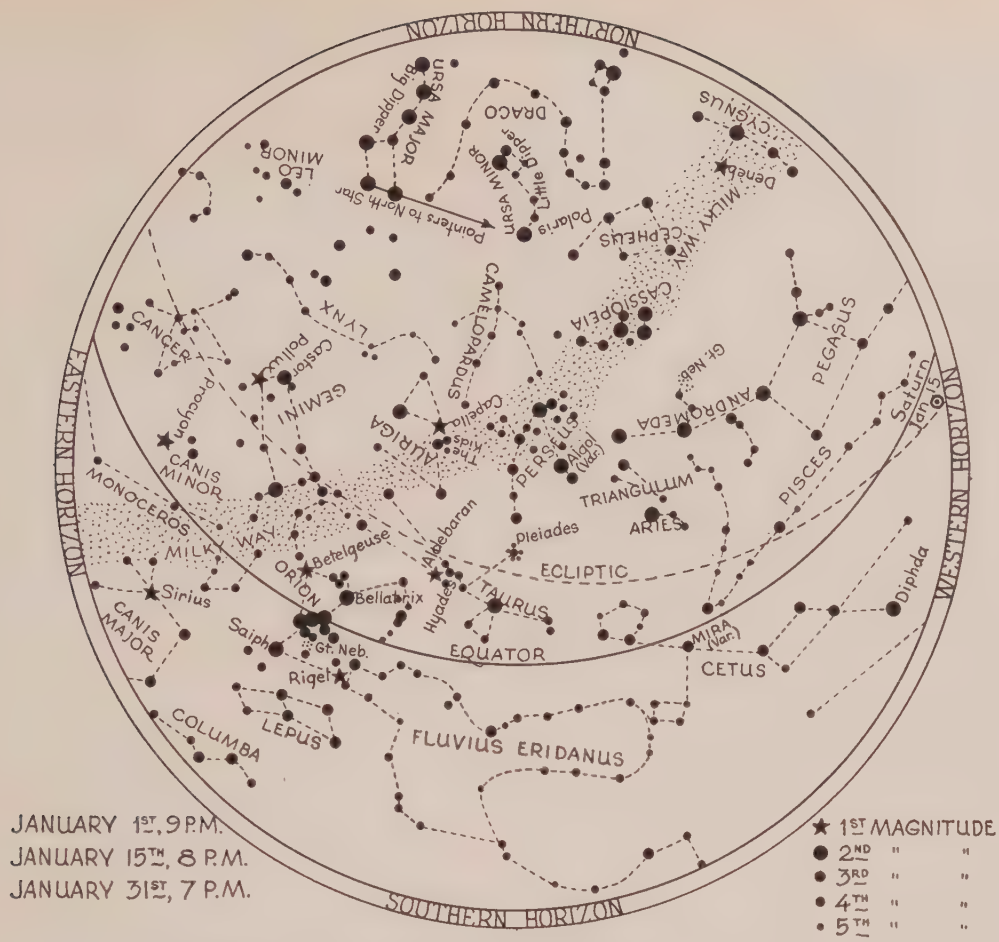
OLD ORCHARD

By HELEN LILIENTHAL

This old orchard feels the spring now May
Is here. Each tree lifts its gnarled limbs in play,
Dreams it is young, and that its blossoms white,
Are youthful garlands, wears them with delight,
Squanders its scanty petals all too soon
In carnival under a pale full moon.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

Astronomical Phenomena in the New Year

By ISABEL M. LEWIS

THE OUTSTANDING astronomical events of the coming year will include a total eclipse of the sun on June 8, a partial eclipse of the moon on November 18, and an annular eclipse of the sun on December 2 and 3.

Saturn's rings, even when viewed through the most powerful telescopes, again will disappear temporarily on February 20 when the earth will pass through their plane from north to south.

Venus will have its greatest brilliancy in the evening sky of March 12 and in the morning sky on May 23. It will pass from the evening to the morning sky on April 17, when it will be in inferior conjunction with the sun. After that date, Venus will be a morning star for the remainder of the year. It is now a magnificent object in the west at sunset and will continue to increase in brightness until March 12. It will be at its greatest distance east of the sun early in February when it will set more than three and a half hours after the sun.

There will be two occultations of bright planets by the moon visible in the eastern part of the United States this year, one of Mars in July and the other of Venus in August.

A rare astronomical event will be the grazing transit of Mercury across the sun on May 11. This will be visible only in the Philippine Islands, western Australia, the Indian Ocean and central and southern Africa. The last transit of Mercury occurred November 10, 1927, when the planet could be seen telescopically as a small black spot crossing the face of the sun. The next transit will occur in 1940 and the one following that on November 14, 1953.

The earth will be in perihelion, or nearest the sun, on January 1 and in aphelion, or farthest from the sun, on July 4. These times vary but little from year to year. Although one might expect that for this reason the summers of the southern hemisphere would be hotter and the

winters colder than the corresponding seasons in the northern hemisphere, there is actually little difference in the respective seasons in the two hemispheres. If anything, the seasons are milder in the southern hemisphere because there is more water surface there than on this side of the equator, and it is well-known that the extremes of temperature are greater over land than sea.

The eclipse of June 8, 1937, is an example of the seeming perverseness of total solar eclipses in picking out portions of the earth's surface most unfavorable for their observation. This eclipse will have the longest duration of totality of any eclipse that has occurred in the past thousand years—seven minutes and four seconds on the central line at the place where the eclipse occurs at noon. The maximum duration of totality possible for any total solar eclipse is seven minutes and thirty seconds, approximately. The path of totality will have a length of about eight thousand miles and a width of approximately 140 miles and will cross the Pacific Ocean in equatorial regions from a point in longitude 170° east and 12° south, where the sun will rise totally eclipsed, to a point in South America in longitude 71° west and 12° south, where the sun will set totally eclipsed. Yet, in a most astonishing way, it will manage throughout its entire course to touch no land except a few small coral atolls of the Ellice and Phœnix groups, the northwestern tip of Christmas Island in the Line group, and a small strip of land in Peru where even at the most favorable point on the coast the eclipse will occur within about one-half hour of sunset with the sun too close to the horizon to permit observations of any scientific value. The duration there will be a little more than three minutes. At Christmas Island the duration will be only about one-half minute. This is a large island about thirty-five miles long and the southern limit of the path of total eclipse crosses the northern part of the island. Fanning Island, about 145 miles northwest of Christmas Island, lies only a few miles outside the northern limit of the path of total eclipse and the sun will be over 99% obscured there at maximum eclipse. The most favorable location for the scientific observation of the eclipse will be on Enderbury Island of the Phœnix group, an uninhabited island about two and one-half miles long where there is no anchorage and landing is dangerous. Here the mid-eclipse will occur shortly before 8 A. M. and the total phase will last more than four minutes. So far there seems to be little prospect that any scientific expedition will be sent to this island. The path also passes the Galapagos Islands where there will be a partial eclipse, but the central line will miss the nearest island of the group by more than one hundred miles. The maximum duration of seven minutes four seconds will occur in longitude 130° west, latitude 10° north, with the sun on the meridian and not far from the zenith. Scientific observations of considerable value might be made aboard ships in this vicinity or elsewhere along the track and it is to be hoped that this wonderful opportunity to see the solar corona and all the other impressive phenomena that attend the total phase may be granted to someone who finds himself, by chance or design, at the right place at the right time for the record-breaking period of more than seven minutes.

The annular eclipse of December 2 and 3 is also remarkable for the fact that it crosses the Pacific, touching only two or three of the Marshall Islands, the Washington and Fanning Islands and two of the Line Islands. It is interesting to note that the paths of these two eclipses cross near Fanning and Christmas Islands, and a point a few miles south of the former will lie in the path of both the total solar eclipse of June and the annular eclipse of December. An annular eclipse does not have the same scientific value as a total solar eclipse as the sun is never completely covered by the moon at the time of greatest eclipse and the corona is not visible. The duration of an annular eclipse may greatly exceed that of a total eclipse and the annular phase of the December eclipse will have a maximum duration of twelve minutes where the mid-eclipse occurs with the sun on the meridian.

The partial eclipse of the moon on November 18 will be visible from all parts of North and South America but it will be very small, as only fifteen-hundredths of the moon's diameter will be covered by the earth's shadow.

The planet Mars will come into opposition this year on May 19 and will be nearest the earth on May 28 when its distance from us will be about 51,000,000 miles. Mars comes into opposition with the sun at intervals of a little less than two years and two months. At a favorable opposition, such as occurs once every fifteen or seventeen years, the planet is only about thirty-five million miles from the earth; at an unfavorable opposition it is about sixty-three million miles away. This great variation in the distance of the planet from the earth at different oppositions is due to the considerable eccentricity of its orbit, which is greater than that of any planet except Mercury and Pluto. There is, therefore, a great difference in the brightness of the planet and the visibility of its surface markings at different oppositions. Mars is now becoming more favorably placed for observation at each return and the coming opposition will be fairly favorable for observation of the surface of our small neighbor. Mars is in Virgo a few degrees northeast of Spica on January 1st and will move eastward into Libra during the month. It rises after midnight and is high in the southeast at sunrise. It will surpass Spica in brightness during the month. Jupiter is now in the morning sky but too close to the sun to be seen to advantage before the end of the month.

Saturn is visible in Aquarius in the western sky of the early evening. It will be in conjunction with Venus on January 23. Venus is a magnificent object in the western sky after sunset, far outshining all other stellar objects. Mercury will be in inferior conjunction with the sun on January 14 and will not be visible this month.

Hiking and Camping Forum

Conducted by
ERNEST A. DENCH

Hiking and Camping inquiries will be answered by mail if a stamped, addressed envelope is enclosed. Address the Forum editor

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One Experience Calls For Another

More firsts than the first

REMEMBER how nervous you were the first time you got lost in the woods, until you calmed down to take stock of your surroundings? "My kingdom for a brook or a river," you gayly chirped to yourself. That forced optimism at sunset tended to curb your innermost fear of an involuntary overnight sojourn in the forest. Not long after you came upon the bed of a stream, and, by following it downhill, you reached a grain field at dusk. Tenseness gave way to joy.

You will also recall the time when your first high mountain seemed impossible of attainment. You were troubled by the succession of false tops. Great was your feeling of ecstasy when you could travel no higher.

You did not choose a propitious time for your first campfire venture. As a matter of fact, the Weather Man took the control out of your own hands; but, anyway, you decided to go through with it in the rain.

Your victory reached a grand climax the moment you poured out a *second* cup from the pot of coffee brewed over the open fire. Why do we skip the *first* cup? Because it would have been your *last* cup that day had the brew proved of poor quality.

All these personal accomplishments stand out in your memory, and it is a natural wish to re-capture the original thrills. You come to regard the locales as natural shrines—*your* shrines, and the subsequent scenes of anniversary celebrations. Any such return visit falls flat. The glamor or thrill has departed, never to return. Time does not stand still—and you are a year older, more seasoned to the woods and hills. Another angle is that these incidents were naturals; and now, a year later, you are attempting to artificially revive them.

It is also a lamentable fact that there are thousands, who, from force of habit or a desire to follow the lines of least resistance, frequently return to the same old campsites and follow the self-same trails. Small groups of friends often do this because the organizing of such trips is automatic. They know they are reasonably certain to find some of their companions at the chosen place any week-end. One by one the friends tire of the surroundings, and the group disintegrates. The situation may bear comparison with living in a beautiful spot all the time. When its beauty is taken for granted, the charm is gone.

NO NEED TO LEAVE THE YOUNGSTERS BEHIND WHEN YOU HAVE THESE ESPECIALLY CONSTRUCTED KNAPSACKS. THE THOUGHTFUL PARENTS ARE MEMBERS OF THE CONTRA COSTA HILLS CLUB OF CALIFORNIA

This constant repetition trend is also noticeable in hiking club management. One club which, for years, had an enviable reputation for pioneering is now on the downgrade. And the reason is that the club is doing nothing to encourage its leaders to undertake local and long-distance exploration work. It now offers a schedule of routine trips, without adding anything new to lend variety.

The right personal attitude is to expect new firsts, not rehashes of old ones. There is no end to them if your mental outlook is forward rather than backward.

Certain things at which you are now proficient are now in the routine class. But have you ever tried to bake a cake in a reflector oven? If not, here's a first, which, if it has a successful termination, will make you a difficult person to associate with; for you will wish to tell the world. Should the cake fail to make the edible grade, your sense of humor will be your best weapon against the good-natured kidding of your camping associates.

A perfect night's sleep between blankets on the hard ground is a knack which requires the patience of experimentation to make the blankets stay put despite the tossing around you do, and to find ways of overcoming the bumps in the earth under the ground cloth. Such a success-

THE UNIVERSITY OF COLORADO'S HIKERS CLUB HALTS FOR A PICTURE ABOVE TIMBERLINE ON THE WAY TO THE ARAPAHO GLACIER

ful first will give you an elated feeling.

Most hike leaders know a small sector which can best be described as tricky. One abandoned hilltop farm location, now in second growth woodland, is a veritable maze of paths. At first it baffled the Forum editor. After methodically exploring each and every path, he discovered that the paths radiated from a center point, inside which were innumerable loops, with a dirt road outlet at each far end. His pleasure can well be imagined, when, on the next club lead there, the identical windmill failed to face him both going in and coming out!

The flora and fauna firsts are practically inexhaustible. No trip need prove monotonous if you undertake to recognize one new plant, bird, mammal, insect or mineral.

The contrast of seasons also affords new opportunities for study. Particularly is this true of winter, when the snowy ground reveals the footprints of the wildlife of the woods.

This deliberate seeking of new firsts adds immeasurably to your enjoyment of the countryside.

Brevities

The Appalachian Trail is now within 3½ miles of completion. . . . According to a Potomac Appalachian Trail Club announcement, you should "obtain a ski which reaches to the base of your thumb when the arm is extended." Hikers and campers will benefit by the program of the Lynchburg (Va.) Bridle Path Association. Paths will be cut in mountainous sections away from the honking auto. . . . "The Pudding Digester" is the post-Christmas annual hike of the Southern Chilterns Association, England. . . . Because of vandalism, the Wy-east Climbers (Oregon) are compelled to discontinue the first aid box at their Crater Shelter cabin. It held $75.00 worth of equipment. . . . *Hiking in Marin* is an illustrated folder issued by the Northwestern Pacific Railroad, San Francisco. It is based on reliable data furnished by the Sierra, California Alpine and Contra Costa Hills clubs. . . . *Your Hike Today* is a regular column contributed to the Los Angeles Sunday Times by Will H. Thrall, president of San Antonio Club. Itineraries for auto owners who wish to travel on foot for a few miles, are given. . . . A squad of U. S. Forest Service rangers arrested a club group concluding a week-end trip in a western forest. The offense was leaving burning coals in an open air stove grate, and neglecting to burn or bury the garbage. It will take this well-known club years to win back the prestige a careless leader shattered at one blow. . . . Far from flattering to Youth Hostelers is this excerpt from the Scottish handbook: "During the day you should be on the road to the next hostel, or else out walking or climbing. It is the only time the warden can get a little peace." . . . Saturday afternoon walks in suburban Philadelphia have been going since 1909 by the *Wanderlust,* a physical health activity of the Quaker City's school system.

Campfire Breakfast Experiment No. 1

The Forum editor is conducting a series of winter camp cookery trips in the Northwestern Jersey highlands. The main purpose is to try out new or improved foods, or little-known or neglected ones, and ascertain their adaptability to camping.

The campfire breakfast served on the first trip consisted of cranberry juice, cooked wholewheat cereal, Jersey pork roll, cocoa and marshmallow whip.

Let us now review the menu items one by one, to disclose how this well-balanced breakfast was produced:

Cranberry Juice

4 oz. bottle per person, altho, if weight and bulk are problems, it is available in pints, quarts and gallons. It has a slightly tart flavor. We consumed our rations before proceeding to the cooking of

Granular Whole Wheat Cereal

A 24-oz. package is equal to 6½ lbs. of cooked foods, and allows for 21 generous servings. It should have long-keeping properties, as it is in grain form. As the water first has to come to a boil, and then maintained at boiling point, we decided the portable kerosene stove would do the job faster and more evenly than an open wood fire. It took about 15 minutes to bring a quart of water (sufficient for 4 persons) to a boil, and 30 minutes longer to cook the cereal. It was individually served in bakelite saucers, with fresh milk and sugar added. A tasty but chewy cereal was the verdict.

Jersey Pork Roll

While this is a standard line at most eastern delicatessens, rarely can you get the product of the firm which evolved the original recipe. Now sold direct to the consumer in a 3 lb. cloth bag. The manufacturer reminds us—"to have no fear of the keeping qualities of the product, so long as cold dry air circulates through the bag. In cold weather it can be carried in knapsacks for as long as you wish. During a prolonged spell of warm but humid weather, the outside jacket may become moldy, but that does not spoil the meat. Peel off the bag from the roll and wipe off the rind with a cloth rinsed in a salt solution."

We grilled thick slices of the meat on a large hand grill over an open fire. Meantime slices of bread had been buttered, and made ready to receive the hot meat. The hot sandwiches proved delectable. Our estimation, based on two thick slices per person, is that a 3 lb. roll will serve 14. It will make a change from that old standby, bacon.

Instant Sweet Cocoa

Cocoa, sugar and milk are pre-mixed in powdered form, in a ½ lb. can. We had a pan of it on the open fire, mixing water with the powder in the required proportions. We found it satisfactory, but if tastes run to a *rich* cocoa, either liquid or powdered milk should be added. In lieu of whipped cream, we used

Marshmallow Whip

Of a particularly light and fluffy texture, made by the same firm as the cocoa. It comes in a 12 oz. can with a slotted lid.

At the conclusion of breakfast we had partly-filled cartons of cereal and sugar. We separately dumped the easily-spilled contents into oiled silk food pouches, the latest on the market. The slide fasteners kept the foods intact.

Further information on the above branded products is given in the *January Gadget List,* which may be obtained by sending a stamped self-addressed envelope to the Forum editor.

January Gadget List

1. A new type of attachable heel appears on the market with the claim that any type of sturdy boot can be used with it, for ski-

(Continued on page 62)

An Ishmael of the Ocean Beach

(Continued from page 11)

they suggest that long arduous trail of life that has led upward through evolutionary ways into the comparative securities of mutual confidence and cooperation. Nevertheless, it may be said of Beachy, as of few other felines beaten upon and harried as she had been, that no wound was ever inflicted upon any one that I knew by her teeth or claws. Her ways were peaceful, even when she was driven to the severest extremity. So even the last great adversary she ever was called upon to face, and which arrived in the merciful person of a veterinarian summoned to assist her because of old age and obvious ailments—even this final mystery she accepted with only a feeble and momentary outcry.

Nature Journal

We are pleased to note the appearance of the first issue of the *Shenandoah Nature Journal*, published by the Shenandoah Nature Society, a non-profit organization formed for the purpose of encouraging appreciation of flora, fauna, geology and history so that more people may find recreation and knowledge along the trails of Shenandoah National Park in Virginia. The first issue contains interesting and informative articles on the geology and wild life of the area and is well illustrated. Friends of the Park are invited to become non-resident members of the Society. Membership dues are one dollar per year, and this entitles members to receive all publications of the society for that period. Headquarters are at Luray, Virginia.

The Loon Under Water

Park Naturalist C. A. Harwell of Yosemite has measured and timed fourteen dives of a loon that inhabits the crystal-clear waters of the Merced River. He found that during the fastest dive the bird traveled 3.1 miles per hour, good walking speed for a man, and that the average dive was 194 feet, requiring 56 seconds. This is an average speed of 200 feet per minute.

Hanna Star Dome

A concisely written booklet that contains most of the major facts concerning the astronomical universe about us has been released by the Cleveland Museum of Natural History. Besides being full of interesting data about the planets and constellations, the booklet serves as a vehicle for introducing the Hanna Star Dome to the public. The dome, of solid copper and weighing one ton, is 16 feet in diameter and is made in 24 sections bolted together. It is located in the Museum's exhibition building, and was the gift of Mrs. Paul Moore of New Jersey in memory of her father, Leonard C. Hanna. Holes of varying sizes were drilled in the dome to represent the stars of the heavens, in which were placed glass reflectors and electric light bulbs. Two months were required to place the 48 constellations visible in these latitudes in their proper places for the different months of the year, and during Museum hours, visitors can see the star-groups just as they will appear between the hours of nine and eleven o'clock on the evening of their visit.

The booklet also contains star maps that

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Nature Magazine in School

A Department of Aid to the Teacher

In order that teachers and parents may further use Nature Magazine as an aid to the study of Nature and Science, this page is devoted to the following brief notes based upon articles in this issue and suggesting ways in which they may be used as a source of inspiration and information. To bring these Nature study thoughts to our readers we have obtained the services of one eminently qualified for the task, and this department is edited

BY ESTHER SCOTT

Instructor in charge of Elementary Science
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An Ishmael of the Ocean Beach

If we investigate the reasons for the decrease in the bird population in suburban areas, the house cat is found to be one of the chief causes. The abandoned cat is a serious menace to wild life, and could very appropriately be studied as an example of a predacious form that tends to interfere with the balance of Nature. A number of excellent suggestions for the study of Balance are made on page sixty-five of NATURE MAGAZINE'S Guide to Science Teaching. This subject could be considered in connection with a unit dealing with the habitats of plants and animals. A contrast could be made between the types of homes which birds and animals had at the time of the colonization of this country and today, and the types of enemies from which they had to escape to survive. When one stops to consider the greatly reduced area which is available for the homes of birds, the introduction of the starling, which appropriates the nesting sites, the scarcity of dead trees or dead branches in which nest hole building birds can build, the injustice of turning loose a flesh-eating animal that must kill anything it can in order to survive becomes very evident.

On the other hand, the injustice to the cat is splendidly expressed in the article entitled "An Ishmael of the Ocean Beach."

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Prehistoric Weather

The cycles and sequences described in this article are excellent science material, as the data upon which these have been determined are given.

Before reading this article pupils might be given such a problem as this: Are there any records other than those kept by man by means of which the weather could be determined a thousand years ago or even for a much longer time?

If annual rings of trees were offered as a possible source of data, pupils could be given the project of counting annual rings on a tree stump and comparing the relative widths with the relative amounts of rainfall given by the records of the Weather Bureau for the given years. The determination of weather from fossil trees would bring up the question of how men can determine the period when the tree was living. This would necessitate some understanding of the formation of rocks and the preservation of fossil remains. In this connection, pupils can make some impressions in mud and allow them to harden, and then cover the surface with sand to demonstrate how fossil footprints might have been preserved. The suggestion given in the article of cutting out a block of mud containing imprints of raindrops is a good one. It would be used to determine the direction of the wind if the block had been carefully marked with the points of the compass before it was removed from the place where it was found. The actual direction of the wind could be found by referring to records of that particular storm. In fact, one group of pupils could keep the record by actual observation and another one by trying to determine it from the impressions.

The formation of layers of deposits can be demonstrated by putting sand, clay and pebbles in a jar of water, shaking them up and then allowing them to settle, noting the order in which they occur.

The author's caution in regard to the misinterpretation of the causes of climatic changes should be observed. For instance, the desert that now threatens the Middle West may be caused as much by deforestation and overgrazing as by a cycle of changing weather conditions.

●

One Man's Bird Family

This interesting account of very successful bird taming should be recommended for reading by pupils who are especially interested in birds. The paragraph in which the unusual song of the captive meadowlark is mentioned supports a theory held by some naturalists that both the song and nest-building habits of wild birds are learned from the parents by the young. If the young birds were raised in captivity or under circumstances which made it impossible for them to acquire the tune of their parents or become familiar with the type of nest built by them, they tend to copy the songs or nests of birds with which they are placed.

●

The Spiders—Our Friends

In consequence of the propaganda about the "Black Widow", all kinds of spiders are having an even more difficult time to survive than ever before and so it is quite important that the life history of spiders be included in a series of lessons on creatures valuable to man. See heading, "Balance Experience Realm," in NATURE MAGAZINE'S Guide to Science Teaching.

Spiders can be kept successfully in a terrarium or insect cage if enough flies and other insects are given them for food. By comparing them with insects, pupils can find out how spiders differ from insects in the number of their legs and body parts, their spinnerets, jaws and poison glands.

In captivity a well cared for spider often makes a web. The beautiful web of the orange garden spider and the funnel-shaped web of the grass spider are both worthy of attention. It is interesting to find out in which kind of web there will be captive insects and how the other type of web is used; how each type of web-weaving spider captures its prey, how it eats and what it does with the parts not consumed at one meal.

The wolf spider, the jumping spider and the trap door spider catch their prey without the help of a web. It is interesting to see a mother wolf spider with her young. Egg cases of different species of spiders can be collected for study. However, as the warmth of the school room will make them hatch out prematurely, they should be kept out-of-doors and only brought inside for study. If the eggs in one egg case are allowed to hatch in the insect cage, the ancient law of the survival of the fittest may be seen in operation as the stronger spiders eat their less robust sisters and brothers.

●

The Red-Bellied Mud Snake

When properly introduced, few children are really afraid of snakes.

One teacher whom I know, when bringing a snake into the classroom for the first time, has it concealed in a box. She asks which pupils are very brave and has these pupils sit near the box. After she asks if they are ready to see what is in the box, she gently lifts the snake out. One of the "braver" pupils has the pleasure of holding it first. Strange to say, most of the pupils in the school want to hold the snake before the end of the lesson. They have to be told one of the secrets of snake charming which is to support the snake gently but firmly by holding enough of the coils so that the snake has no fear of falling. Pupils can feel the scales on the underside of the body and see the little forked tongue which is used as a feeler and is quite harmless even if it touches a person.

They should learn how to tell the harmless snakes from the harmful ones, that harmful snakes in this country (excepting the coral snake) have heads which are decidedly triangular in outline when viewed from above, and have a pit between the eye and the nostril. All poisonous snakes are armed with hollow or grooved teeth, fangs, through which the poison is injected into the victim; no snake can strike a greater distance vertically than half its length; snakes move by walking on tips of their rib bones holding onto the ground by means of the scales on the under surface of the body; most snakes are beneficial or neutral, since most of them eat insects and some eat other snakes, even the poisonous species.

It may be possible to borrow the skull of a poisonous snake from a museum so the pupils may see the mechanism of the fangs.

A working model of the head of a poisonous snake can be made by fastening two bent wires, representing fangs, to a section of board, representing the upper jaw, which is hinged to another section of board representing the lower jaw. It is possible to adjust the model so that the "fangs" are projected forward when the "jaw" opens.

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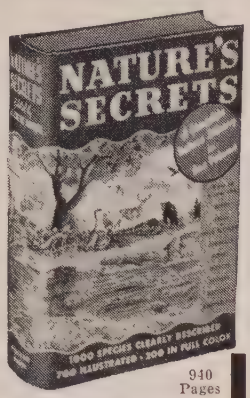

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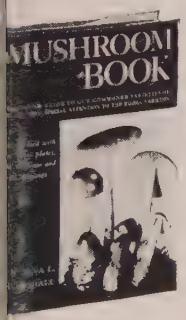

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can be used in connection with the dome or in the field. Dorothy A. Treat is the author, and the booklet is available from the Museum at Cleveland for 25 cents. Ask for Pocket Natural History No. 6, Astronomical Series No. 1.

Audubon Fellowships

The establishment of a series of fellowships at selected universities, if present plans are carried to conclusion, will feature the 1937 program of the National Association of Audubon Societies. The plans for this program were brought out at the thirty-second annual convention recently held in New York City by John H. Baker, Executive Director.

Mr. Baker, in outlining the program, said in part:

"The NAAS has for its purpose the preservation of every species of native bird and animal. It believes that this objective is biologically sound and to man's best interests. * * * Conservation of rare species should mean not only preservation from extinction through protection and establishment of refuges, but also active measures to increase their numbers and distribution. A fundamental weakness in our conservation movement to date lies in the lack of management procedure for the increase and preservation of biologic remnants.

"The NAAS therefore proposes, with the cooperation of interested organizations and individuals, the establishment of a series of Audubon Fellowships. The plan involves the cooperation of selected universities where the research work would be carried on in detail by well-qualified, mature students, working for a degree, under the supervision of professors especially qualified to direct the project. In many cases it will doubtless seem advisable to utilize the joint services of experienced field men in a given territory, but we believe the concept thoroughly sound that the ecological study and the drawing of conclusions as to methods of preservation and restoration be in the hands of a qualified young man, possessing a fresh approach to the problem and not handicapped by preconceived prejudices or opinions."

Baker said that he believed the average research project would require three years and an annual contribution from the NAAS of about $1500 to cover compensation to the student plus travel expenses, the university to contribute the equivalent of $1000 to $1500 in services and equipment. Certain fundamental problems that Baker hoped would be attacked through these fellowships included: 1, advantages of natural versus artificial production; 2, wisdom and extent of so-called "vermin" campaigns; 3, wisdom and extent of use of poison baits as a method of control; 4, the effect of poison sprays on wildlife in the area; and 5, the effect of lumbering on wildlife in the area.

"The NAAS would like to initiate," Baker declared, "with the cooperation of the newspapers and the universities, an educational, shall I say, rather than research, project whereby the 'Rod and Gun' editors would receive opportunity to gain instruction in the fundamental principles of conservation of wildlife."

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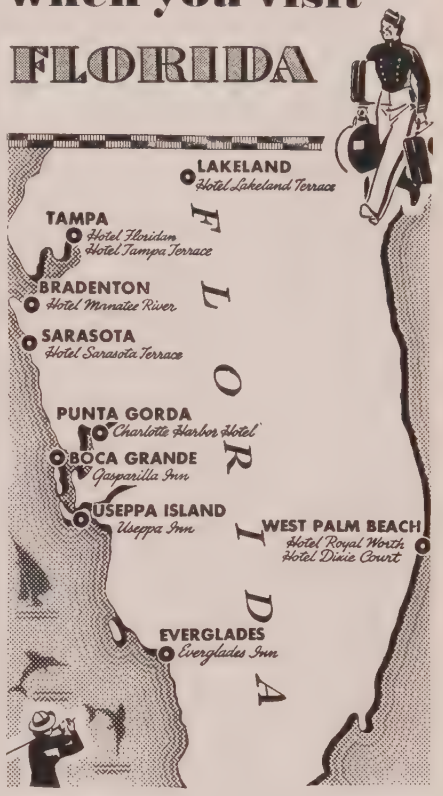

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Stories of Dogs

To the best of our knowledge what Frances E. Clarke has done in her book *Valiant Dogs* has never been done before. For that reason this book should encounter a hearty response from dog lovers everywhere because here we have a collection of great dog stories drawn from contemporary literature. Miss Clarke, who is widely known in humane education fields, has, we suspect, read many hundred dog stories, and from these she has chosen, with notable ability, twenty-six stories for inclusion in this volume. Thomas Boyd, Stephen Crane, Mazo de la Roche, Anatole France, John Galsworthy, Sir Wilfred T. Grenfell, Albert Payson Terhune, Booth Tarkington and Hugh Walpole are among those whose dog stories have been gathered between the covers of Miss Clarke's book. And we were particularly delighted to discover that Alexander Woollcott—since whose departure from the air we have lost interest in the radio—is represented by the immortal story of Verdun Belle. The last bit in the book (and appropriately last because it sums up all that has gone before) is the late Senator Vest's great address to a jury trying a case against a man who had ruthlessly shot a neighbor's dog.

Here, indeed, is a book that any dog lover will welcome as a gift. In it will be found dog stories by authors we did not realize had ever found inspiration in the lives and loves of dogs. Miss Clarke has, through this book, done a real public service and has brought these to many who will give them a full measure of appreciation. The volume is published by The Macmillan Company and the price is $2.50.—R. W. W.

Country Refuge

An entertaining book entitled *A Country Quest,* revealing how one couple spent a six months' vacation on a Michigan farm, has been written by Bertha E. Jaques. An interesting fact about the volume is that the manuscript was written in 1914 "when primitive conditions had not yet given way to gas, electric light, city water and swift automobiles—an exchange of doubtful value," and was not resurrected from a desk drawer until eight years ago and not printed in book form until 1936. *A Country Quest,* in which is set forth the pursuit of rest, recreation, health and happiness of a doctor, his wife and their dog, Shep, among Nature's rural beauties will be enjoyed by every Nature lover. The book is available from Mrs. Jaques at 4316 Greenwood Avenue, Chicago, for $1.50.

Nature's Secrets

Bringing together in one book material originally published in two more expensive volumes, Halcyon House has brought out *Nature's Secrets,* a general Nature book edited by G. Clyde Fisher. While this is described as "a complete Nature library in one volume," an accomplishment impossible for any one book, this volume, with more than 900 pages and profuse illustration in black and white and color, comes as close to this description as any we have seen. The book is well arranged and covers one thousand different species in several fields. There are two hundred excellent color illustrations. This edition is a popular one, and at the price of $1.89 is truly a bargain.

NATURE IN PRINT

As a convenience to readers the books reviewed in this department of Nature Magazine may be ordered through the book department of the American Nature Association.

Wild Bird Songs

Albert R. Brand has prepared a sequel to his *Songs of Wild Birds* entitled *More Songs of Wild Birds.* Like the forerunner of the series, the text is subordinated to the novel bird sound records. There are three of them, double faced, on which have been recorded 43 songs of our common North American birds. Including the set in the first book, over 75 songs are now reproduced in this way. The book itself contains extensive comment on the attributes of bird song and its varying significance. Thomas Nelson and Sons are the publishers and the book is available from them for $2.50.

For Young Aquarists

The rising generation of aquarium fish fanciers now come in for consideration with the publication of *An Aquarium Book for Boys and Girls* by Alfred Morgan. While this is, of course, a beginner's book it seems to us that the simplicity of its treatment makes it useful to adults just taking up the hobby of tropical fish as well as to youngsters. Mr. Morgan devotes the first part of the volume to fundamentals, to goldfish and the mechanics of setting up the proper aquarium. From these he proceeds to the more common tropical and other aquarium fishes, to scavengers and to the frogs, tadpoles and toads that may be inhabitants of the aquarium. The book should be particularly useful in schools, many of which maintain aquaria that are generally supervised by the pupils. The publishers are Charles Scribner's Sons and the price is two dollars.

Nature Study Book

The Teaching of Nature Study and the Biological Sciences by Harrington Wells, professor of biological science at Santa Barbara State College, has just come to us from the presses of the Christopher Publishing House, Boston, Massachusetts. His book is, of course, directed to the teacher of both Nature and general science, and the author devotes his first two chapters respectively to method and to laboratory work. From these he proceeds with a chapter on Nature study in the kindergarten and primary grades, and then devotes discussion to the part of Nature study in elementary science; to unit development; to science in the junior and senior high schools; field work, teaching qualifications and teacher aids. Mr. Wells provides an excellent bibliography and a full list of references to selected magazine articles, mainly from magazines that may be presumed to be preserved in school and other libraries. We are interested to note that Nature Magazine bulks large in the number of references in this section. The book sells for four dollars.

Canary: The History of a Family

Gustav Eckstein once told an interviewe that he never wanted his life to repeat itself and he has taken good care that it doesn't. After becoming a dentist, he began the study of medicine, and is now assistant professo of physiology at the University of Cincinnati. Still desirous of preventing his lif from becoming humdrum, he turned to writing. His three great enthusiasms, Japan, music and animals, dominate his works. He i interested experimentally in animal behavio and his laboratory door bears the strang sign: "Birds here. No one enter unless hi knock is answered." His latest book, *Canary The History of a Family,* is, at first, the stor of his two laboratory birds and, later, th story of the canary community that resulte from them. The author forgets for the momen such big ideas as species and evolution an tells of their human experiences in the realr of love, sickness, bathing, feeding and reasoning. Each one of his pets, Father, Stripe Mother, Hinge (so named because of hi squeaky voice), Puck and all the rest hav their moments of happiness and sorrow tha parallel our own human existence. It is book of canaries, but also of life. Harpe and Brothers, New York, are the publishers and the price is $2.50.

Manual for Dog Owners

Josephine Z. Rine, well known dog au thority, has written the whole story of th dog in a single volume. It is entitled *Th Dog Owners Manual,* and presents a com prehensive picture of the recognized breed together with a detailed account of their car and training. The history of the breeds tha have come down to us since the centurie before Christ, and the evolution into th breeds we know today are discussed. Metl ods and procedure for training the dog fo competition in shows are described. Grea detail is given to the modern method of ca nine care—the theory of breeding from phys iological, anatomical and hereditary view points. There are also chapters on hom nursing and the ordinary ailments that ca be treated successfully by the amateur. Th section devoted to standards gives the offi cial standard of perfection for every kin of pure-bred dog recognized in America. Th price of the volume is five dollars and it i available from Coward-McCann, Inc., pub lishers, New York City.

Through the Woods

H. E. Bates, an English author living i Kent, made an exploration into the woods o his native land, searching out the secrets o Nature for a full year. When he emerged h had the material for his new book *Through the Woods—The English Woodland, Apri to April.* Mr. Bates writes not only of th woods he now knows, but of the woods o his childhood; he sees the woodland in it relation to people, under a midsummer sun lashed by gales and under a spring rain whe it bursts into bloom. He records its silence and songs, its changes and color. The volum is excellently illustrated with 73 wood cut by Agnes Miller Parker, one of England's outstanding artists; the text blending with the engravings in a rare unity of purpose an effect. *Through the Woods* is priced at $3.0 and is available from the Macmillan Company, New York.

Gentians for the Planting

there is one thing that Dr. George F. ton, Norwich, New York, optometrist, s, it is fringed gentians. And he trans- his affection for these lovely wild flow- into practical form—whereby hangs a

hirty years ago, on a hike in the Con- icut countryside, Dr. Norton came upon rge meadow carpeted with blue. There ned to be acres of gentians, some bear- ripe seed capsules. Some of these he ered, taking them to Pleasantville, New k, where he then lived, scattering the along a small stream in the town. Two later several hundred plants bor- d the stream. From this planting an- r was developed, and these two fields lided the seed for what now became Dr. ton's hobby—more and more gentians. 1925 the *New York Botanical Garden nal* printed a story about Dr. Norton's y, offering, in his behalf, a packet of s to those interested. The *New York* ers carried the story as well, and requests eed in from all over the world. Shortly wards Dr. Norton moved to Norwich, g with him sufficient seed. These were ered in a proper place and now nearly acres of gentians bloom along the es of Chenango Lake.

r. Norton is not yet through. He is rmined that there shall be enough of flowers to assure its perpetuation, he now offers a packet of seed, with ring directions, to anyone who will send ge for packing and mailing and who plant the seed in a place with perfect aage and constant moisture. Just write Dr. George F. Norton, 27 East Park , Norwich, N. Y., enclosing a stamped, addressed envelope.

Rock Garden Show

ny entries already have been received e rock garden exhibition to be held ew York City on May 14-16, the Amer- Rock Garden Society reports. The So- in cooperation with the Horticultural of New York, has chosen the Amer- Museum of Natural History as the place e exhibition, where entries in the 100 00 square foot class, as well as minia- rock gardens and collections of plants cational purposes, have been accepted. ourth annual meeting of the Society will lace on the second day of the exhibi- the high spots of which will be the ess meeting followed by an afternoon

e Society also will hold its annual eon in New York on March 18, the n day of the International Flower Show. Aberconway, President of the Royal cultural Society, will be guest of honor. r information on the Society's spring am can be obtained from Mrs. Dorothy nsell, secretary, at 1260 Sixth Avenue, York.

Hardy Californians

An excellent book with the above title on the less familiar hardy plants of California has been written by Lester Rowntree, well-known authority on native California flowers. It is not a flower handbook; nor is it "just another garden book," as Miss Rowntree only tells us of her experiences with those plant personalities found in the less travelled parts of the state that visitors are not likely to meet on their rapid passage over paved highways. Her book is profusely illustrated by full page photographs taken by herself and was written from notes made on the desert, among the redwoods and on the mountain tops. The Macmillan Company is the publisher and the book retails for $3.50.

Merry Out-of-Doors

A picture, a poem and a bit of prose, these are the ingredients Lila Hurley has used in making her little book entitled *The Merry Out-of-Doors*. For example, she devotes a few memory-evoking words of prose to these interesting themes, proceeds to a light little verse about them and finishes with a picture of a cluster of keys on a twig. This she does with a number of things from milkweed to moonshells. It is a sort of random little book, following no special plan, but it's amusing. The publisher is the Stephen Daye Press and the price is one dollar.

Eating Underwater

A demonstration of underwater feeding by a large bull moose recently provided the occupants of 50 automobiles carrying about 250 Yellowstone Park visitors with an unusual spectacle. At the junction of Alum Creek with the Yellowstone River, the river grasses and plants grow to the surface of the water. Here, at a point where the depth exceeds the shoulder height of a moose, a splendid specimen was seen to wade into the river to the spot where the plant tops were exposed. Only the tip of his nose could be seen as the moose fed on the plants. For intervals of several minutes only a slight disturbance of the water indicated where the animal was feeding. Then, with a snort and much flailing of the water, he waded out and disappeared into the timber.

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Hiking and Camping Forum

(Continued from page 56)

ing. Another claim is that snow does not stick to the special composition of which the heel is made. Scientifically molded strap grooves to hold harness in position.

2. A circular axe stone, weighing 6 oz., is especially suitable for camping, as the stone can be used with water.

3. Plated with cadmium to resist rust, a sports footwear drying device made on the clasp principle enables soaked boots to be hung bottoms up. Clasps are adjustable to any size boot without harsh pressure against the leather or rubber.

4. Metal foot chains with waterproofed composition straps, declared to make chains secure where footing is wet or icy. Weigh 8 oz. per pair.

5. A heat pad which uses a powdered preparation instead of electricity or hot water. Has a host of cold weather uses in camp.

6. An improved electric lantern, 2 lbs. lighter and 35% less in size than its obsolete predecessor. The switch, for one hand convenience, is on the end of the handle. Light beam adjustable to power required. Convex lens claimed to be unbreakable.

7. Ladies can now get ear muffs, or ear protectors as this maker calls them, to match their winter sports ensembles. Choice of 12 colors in plain velvet; 40 plaids and 20 checks. Each pair clamps over the head by a wire spring, which should prove more weather-resisting than elastic.

The additional *January Gadget List* information is available by enclosing a stamped addressed envelope with your request. Or, for 20 cents, this service will come to you every month for a full year.

New Appalachian Trail Marker

The Appalachian Trail Conference is backing a new type of metal marker. If the scientific tests prove as reliable out in the field as they did in the laboratory, the marker should give longer service.

The galvanized iron squares will be treated with copper acetate, instead of being dipped in varnish.

The visibility difference on the trail is that the A-T monogram will be white on a black background—the exact opposite of the present format.

Bridle Trail Developments

Rhode Island has, with the help of the Narragansett Chapter of the Appalachian Mountain Club and riding organizations, developed a series of through routes over unfrequented back roads chosen for their picturesque features.

Maine's imposing total of 13,000 miles of bridle ways, completed late this past fall, takes in every conceivable type of terrain, from the coastal lowlands to the rugged highlands.

Both states have guidebooks in preparation, and these will be reviewed when received.

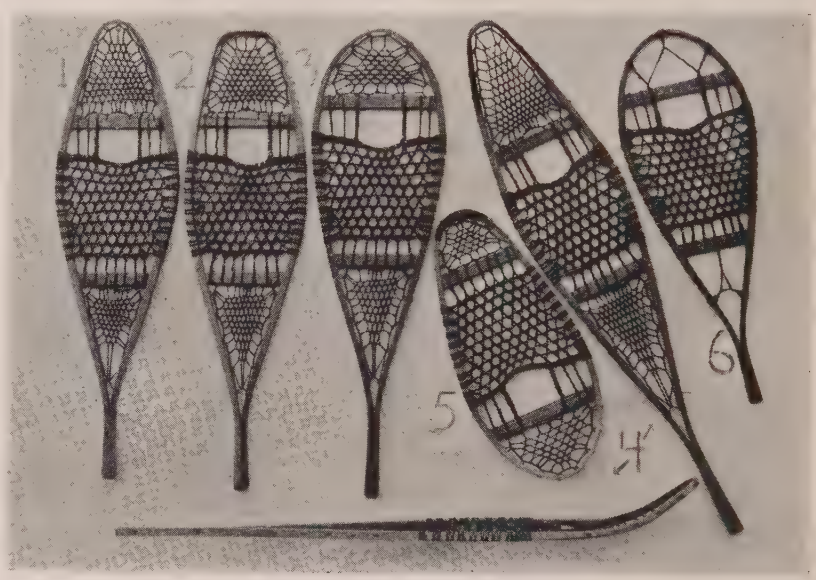
Selection of Snowshoe Model

"There are several things to consider in selecting a pair of snowshoes," says Anderson, Maine snowshoe maker. "A heavily-built man should choose a larger snowshoe than one whose physique is light. This is also true of a tall person. The kind of terrain also requires serious consideration."

Through Anderson's courtesy, we are reproducing a photograph of the six different snowshoe models.

No. 1, *Algonquin* style, is recommended for general use. No. 2, is the *Ojibway Indian* model, popular in Canada. Ideal for hill climbing, as the flat, square toe takes a good grip on the snow. No. 3, *Michigan* style, is in demand in states bordering the Great Lakes. It is admirable for deep, loose snow, where one always has good control of the short toe. No. 4, *Alaska* style, is the nearest approach to a ski, being narrow with a turned-up toe. Unexcelled for fast hiking in level country after a fresh snow fall, and also for breaking trail under such conditions. The shoe is too slippery for other uses. No. 5, the *Bear Paw,* ensures quick turns where there are blow-downs, thick brush and rocks. No. 6, the *Beaver Tail,* is commonly *used* on crusty or packed snow. A large chunk of crust or wet snow goes right through the shoe when it falls on the toe. This model is often purchased to save the crust cutting up a more expensive type of snowshoe.

A DIFFERENT SNOWSHOE FOR EVERY TYPE OF TERRAIN. THE VARIOUS MODELS ARE DESCRIBED IN THE TEXT



Retracing a Famous Walk

Nelson S. Bushnell is a Vermonter who crossed the North Atlantic in a desire to duplicate, 117 years later, the 642 mile walk of John Keats, the famous poet, and Charles Brown, his literary companion.

His poor feet hardened after a while, when he was really able to enjoy the pedestrian pilgrimage. Bushnell had stamina to average 22 miles a day with a 20 pound pack, but most of this mileage was on roads. One day in the Scottish Highlands, Bushnell tramped 12 miles, "plus a 12 mile side trip on Ben Nevis," he admits. Here he "jolted up and down mountain trails paved with sharp-cornered unstable stones."

The reader's interest in this book will hinge on a liking for Keats' poetry, and a knowledge of the British Isles. *A Walk After John Keats* is a Farrar and Rinehart book, priced at $2.50. The illustrations include a condensed map.

Bring Your Own

One by one the clubs are abandoning the communal coffee pot. The carrying of such a large vessel usually falls to the lot of the handful of regulars. Faithful as they may be to club tradition, there comes a time when enough is enough.

In Australia this problem concerns the afternoon tea billy. Henceforth all members of the Melbourne Women's Walking Club will carry individual billies and makings of the "cup that cheers." And even the ladies can use strong language on occasion, for to cite *Wayfaring,* MWWC mouthpiece, "we have heard that big fellow referred to in a variety of adjectives."

Curbing the Hitch Hiker

Oftentimes the solo motorist feels lonely during a long countryside drive, and welcomes the companionship of any hitch hiker he may overtake on the highway.

But he now has a fairly satisfactory mechanical substitute in the car radio, which, muses *Outdoor West News,* "eliminates the danger element. The radio will not hit you over the head and leave you to die along some lonely road."

Outdoor West News favors the passing of anti-hitch hiking laws in all states. The Forum editor notices as many thumbing their way today in his own state of New Jersey as prevailed before the law was passed. Laws without enforcement are futile. The best remedy is 100% cooperation among auto owners.

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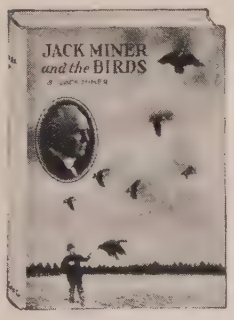

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Food of the Red Fox

Following Fox Trails, by Adolph Murie, is a 45-page pamphlet recently published by the University of Michigan Press at Ann Arbor. It is a record of studies of a pair of red foxes, *Vulpes fulves*, conducted in 1934 by the author on the Edwin S. George Reserve. This is a 1200-acre area for outdoor study that is administered by the University's Museum of Zoology. Since the area is fenced, and is closed to shooting, it affords opportunity for study in an area where the ecological conditions are approximately normal. Since the foxes living in the reserve had access also to neighboring farming communities they had the usual opportunities to take domestic stock that are afforded flesh eaters in settled areas. Yet the evidence of poultry being taken was fragmentary only. There are extended discussions of the opportunities for obtaining food, of the food items actually detected in droppings, and of the evidence obtained by following the trails. There is a well selected bibliography of the food of the animal and many line cuts and halftones.—E. A. P.

Alaska's Pioneer Naturalist

Georg Wilhelm Steller, the Pioneer of Alaskan Natural History, by Leonhard Stejneger, lately issued by the Harvard University Press, Cambridge, Massachusetts, was written by the one man in all the world best qualified to do justice to the subject. Doctor Stejneger, a Norwegian, came to America and to the Smithsonian Institution in 1881, in his thirtieth year. He had been interested from his youth in many branches of natural history and was already well educated in science and languages.

Animal resources of Alaska, particularly the fur seal, were at that time of great interest. These were inseparably linked with those of the shores and islands of the Asiatic side of Bering Sea, still Russian possessions. Anxious to make a first-hand study of this little known region, Spencer F. Baird, Secretary of the Smithsonian, planned a zoological exploration of Bering Island, the summer home of the vast herds of Pacific fur-seals, cousins of our own species. To Stejneger was entrusted this important task. This investigation, supplemented by other visits to the same region in 1895, 1896-7, and 1922, aroused in Doctor Stejneger the enthusiasm that has led to his writing the life of Steller.

Georg Wilhelm Steller, of German descent, had accompanied as naturalist the famous sea expedition of Vitus Bering from Kamtchatka to various points in the North Pacific, 1741-1743. The expedition touched the shores of America at Kayak Island, near St. Elias Point, where Steller achieved the honor of being the first white man to set foot on Alaskan soil, and discovered a new species of jay which, along with several other notable species, was later named in his honor. On the return voyage, with a sick and exhausted crew, Commander Bering took refuge on the uninhabited island that was later named for him. Here the expedition wintered, and here Steller, in spite of the tremendous difficulties, recorded the natural history observations that have made him famous.

On this same island Leonhard Stejneger found himself on May 7, 1882, and, he says, "literally trailed Steller's footsteps for eighteen months". And from that time until the

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present he has collected every possible scrap of information regarding this early naturalist and, "compelled by the subject", now becomes Steller's biographer.

With the patience and skill of a born investigator, and possessing an unequalled knowledge of the varied marine and littoral life of the North Pacific, combined with scholarship of a high order, Doctor Stejneger has produced a volume that may well stand as a monument to one of his own noteworthy accomplishments, and at the same time serve as a model of what such biographies should be. There are innumerable explanatory notes, an excellent bibliography, many portraits, maps and other illustrations, and an exhaustive index. The press work is excellent.

The book is available from the Harvard University Press at six dollars. E. A. P.

Cascade Mansions

When Dr. John Kenfield and his wife set out on a camping expedition into the wildest reaches of the Cascade Mountains, it was not a pleasure trip but a self-prescribed remedy for his own ills. The exciting story of camping in the mountains, building shelters from whatever materials were at hand, following the trails of wild animals through the forest, camping at night on bluffs overlooking marshes where many types of water birds could be seen, bathing in warm springs hitherto unknown to the white man, is a story of living outdoors with Nature. Anne Shannon Monroe and Elizabeth Lambert Wood are the co-authors of this excellent book entitled *Mansions in the Cascades,* a fictionized story of true events. Mrs. Wood, a descendant of pioneers who drove their ox teams across the plains, has gone through the same experiences in the rugged Cascades herself, and Miss Monroe is the great-granddaughter of George Shannon, a member of the Lewis and Clark expedition. With such a background, the authors have written a book that will be read with interest by all out-door lovers. It is available for $2.50 from the Macmillan Company, New York.

No Place for Miss Muffett

More than one hundred species of spiders have been collected by an entomologist this summer in the Great Smoky Mountains National Park, on the border of North Carolina and Tennessee. Spiders are not classified as insects but belong to the group known as arachnids. Believing that there may be many more previously unknown to the region, the collector plans to return later to continue his study. Most noteworthy of those already discovered are the spiders found in Cades Cave, which are eyeless.

Mary Lou

The Santa Barbara Museum of Natural History reports that snow-white Mary Lou, the albino pocket gopher, has presented the Museum with five snow-white youngsters. The remarkable family was brought from Mr. E. S. Pillsbury's Buellton ranch by Mr. Ervin Ruby. The Buellton region has been somewhat unusually rich in gopher albinism, but the mating of two pure albinos is uncommon anywhere.

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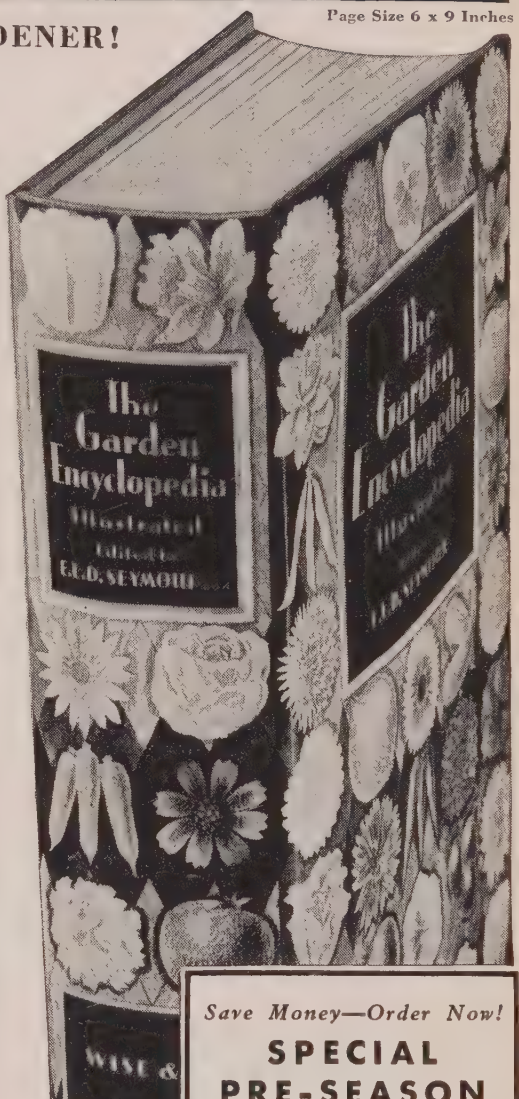

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Photographic Notes

BY SAMUEL BROWN

Winter Movies

The winter season presents a host of unusual and attractive subjects for the February movie-maker. Snow transforms the landscape into a wonderland of beauty that the motion picture enthusiast should be eager to record. With a few appropriate ideas we can start immediately to film our available material.

To start with, it is best to wait for a clear bright day. A cold day generally follows a snowfall and the landscape is covered with a brilliant white blanket. A thin column of smoke rises lazily from a nearby chimney. This makes a good long shot for the beginning of a winter scenario. The lighting of such a scene is important. It should be such that each bump and footprint stands out in contrast to its surroundings. This is accomplished by having the sun to one side or directly in front of the camera. In the latter mentioned case the camera should be in the shade of a building or tree or the lens should be protected by a suitable lens hood. A series of footprints make an interesting shot and they should be fully exposed so the contrast is not too harsh.

In shooting winter scenery it is always advisable to use a light or medium yellow filter to tone down the sky; red filters are sometimes useful for special shots. Green filters are recommended with panchromatic films. Since evergreens have a tendency to register too dark, green filters enable them to come up somewhat more brilliantly.

A few shots of people will be interesting and unique and unusual effects are possible when the sun is behind the subject. Be sure, however, to have the lens carefully shaded. Here we might stress one important point. When a sequence is being taken of any close subject, the exposure should be read with the meter close to the subject. Snow reflects such a tremendous amount of light that an erroneous reading may be secured if the meter is allowed to "see" too great an angle.

In making motion pictures there are a few facts that one may do well to keep always in mind while shooting. Foremost is the fact that we are dealing with motion and a still scene becomes boring if one's attention is held longer than is necessary to get a general idea of the subject. *Take as few still shots as possible*—four to five seconds is sufficient! In photographing action, start the camera just before the beginning of the action and stop it shortly after it. Another important fact to remember is that your audience will see the picture exactly as the lens sees it. *Keep the camera still* or, if you must move it, do so slowly so that the motion of the camera is hardly perceptible. Let your actors do the acting for the camera! A tripod is very useful and an important accessory.

Correct exposure in movies is more essential than in still photography and for this reason a reliable exposure meter should be used. When shooting on dull days this is doubly important since only with correct exposure is it possible to obtain brilliant pictures. When working on dull gray days, try to introduce contrast whenever possible. Various planes of different tones give depth and a stereoscopic effect.

Rather than take random shots, the movie maker should plan his film so that it will have continuity and tell a story through its whole showing. Winter sports present material in abundance for this. Tobogganing and skiing parties are excellent subjects from which to work up a story. The sequence might begin with the party leaving the city showing the group, loaded with skis, knapsacks and blankets, getting into the cars. This scene may be followed by a few scenery shots along the way. A close shot of the party leaving the cars, fixing skis or getting into toboggans makes a good follow up. A long shot of the complete ski run is interesting. A few jumps and falls make good shots. Don't forget to save some film for a few shots of the group lunching and a few scenes on the way home.

Some machines, if not carefully oiled, have a tendency to slow up and even stop in cold weather. Have your camera cleaned and oiled before starting the winter's photographic activities.

Amateurs should not deny themselves the thrill of bringing their relatives and friends to life on the screen. Contrary to popular opinion, a motion picture camera, particularly one making 8 mm pictures, is comparatively inexpensive, the operating cost is low, and it is entirely practical in operation.

Films

Last month panchromatic film was carefully discussed. The various uses and characteristics of both fine grain and high speed, full color sensitive emulsions were analyzed when used without filters. Panchromatic films have an almost unlimited range when properly used with filters.

While panchromatic emulsions have been considerably corrected for color, they are still somewhat over-sensitive to blue. This must be partially reduced to give good rendition. Yellow absorbs blue, and a filter of this color placed over the lens when using panchromatic film will give good correction. The amount of correction, in turn, varies with the depth of the filter used—a K-1 correcting slightly, K-1½ fair and K-2 almost perfect. K-3 and G filters over-correct somewhat, the latter to a greater extent than the former.

Where full, perfect correction is required, some of the red rays must also be eliminated. Blue absorbs red, and to cut out the proper amount of red and blue with one filter, a combination of yellow and blue is designated. This results in a green filter and is known as X-1. Artificial light presents another problem. Since mazda light is rich in red quality, there are more of these rays to be eliminated in addition to the excess of blue and for this reason a darker green filter known as X-2 is necessary to correct perfectly.

In photographing subjects over great distances, particularly mountains, there is, many times, an unseen obstacle to good results. This is haze or the scattering to the blue and ultra-violet rays of light by the dust particles in the air. Green rays are scattered less than blue and red comes through almost entirely unobstructed. Since panchromatic films are more sensitive to green and red than orthochromatic films, they are not as susceptible to haze. This, however, occasionally proves troublesome and it is therefore best to use a filter. Where short exposures are important, one of the K series of filters may be used with good results. A "G" filter gives better results while a red filter cuts through haze with remarkable results.

Many unusual effects are possible when using panchromatic films with a red filter. Red absorbs blue in varying degrees, depending on the depth of the filter used. In outdoor photography red filters are used to simulate a night effect. Due to their absorption, they render white clouds against a black sky. This may be carried a little farther

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Finopan	1½	1½	2	2	3	4	6	11
Superpan	1½	1½	2	2	3	4	6	11

THREE SCENES FROM A THRILLING WINTER SCENARIO; AN IDEAL SETTING FOR AN AMATEUR PHOTOPLAY. PHOTOGRAPHS BY HENRY W. HERBERT

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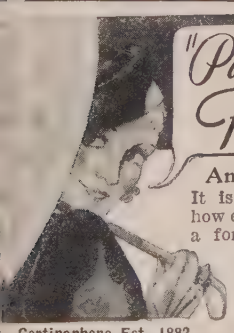
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Trade Hints and New Books

The *Tabloid Guide to Photography* is a fine little booklet designed to be of aid to the amateur photographer. Its primary purpose is to assist in an understanding of the chemical processes involved in photography. Development, fine grain work, intensification, reduction, printing and toning are discussed, and the booklet is beautifully illustrated. Send a stamped self-addressed envelope for your copy.

The Central Camera Company, 230 So. Wabash Ave., Chicago, Ill., have issued a new catalogue describing the photographic equipment distributed by them. An article by Franklin I. Jordan makes this issue particularly attractive. Please be sure to mention Nature Magazine.

The Agfa Ansco Corporation announces *Hypan*—a new 16 mm panchromatic film prepared especially for outdoor work. High speed, brilliance and full color sensitivity are outstanding features. Every motion picture enthusiast should try this new film.

Henry Herbert, 483 Fifth Ave., New York, announces *Lifa* filters. Made from pure glass, carefully tested for optical and spectral accuracy and supplied in mounts to fit all cameras, they are well worth investigation. Henry Herbert will be happy to send literature and descriptive material to anyone who will mention Nature Magazine.

Amateur Movie Production, by William J. Shannon. Published by Moorfield and Shannon, Nutley, N. J., price 50 cents.

Mr. Shannon, well known writer on photographic subjects, has again come forward with a book that fills a long felt want. *Amateur Movie Production,* as its name implies, has been written as an aid to amateurs wishing to produce their own photoplays. Many important angles are discussed, outstanding of which are "Organizing a Movie Club," "The Amateur Producing Unit" and "The Art of Making Up for the Camera." The book is made more practical by the presentation of a sample scenario and two scenarioettes. If you take movies, this book will help make them more attractive.

The photographic department of Nature Magazine is devoted to its readers interested in photography and maintains a service which renders assistance with any photographic matter. You are invited to take advantage of this service. Address all photographic inquiries to Samuel Brown, Nature Magazine, 1214 Sixteenth St., N. W., Washington, D. C.

Cordially,
Samuel Brown

Sells 19 Features In Six Months

"I have sold, up to date, nineteen features to the Detroit Free Press and have been made their correspondent here," writes Mrs. Leonard Sanders of 218 Union St., Milford, Mich., on completing the N.I.A. course. Her skilful handling of feature stories was the reason given by the editor for her appointment. Mrs. Sanders' first feature was sold less than four months after she enrolled with N.I.A.

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Meet Our Authors

Diana Thorne is a well-known artist and etcher who is best known for her dog pictures. She recently returned to her New York home from the British Isles where she had been concentrating on horses as the subject for her drawing board.

Mrs. Ian Thompson Smitherman is a charming southern lady of Shreveport, Louisiana, who delights both in her beautiful garden and in telling others about it.

Hiram Jefferson Herbert is a red-headed Virginian who has been making a name for himself as a writer; particularly as a writer on Nature subjects.

Marie-Anne Jordan, of Newton, Massachusetts, and her husband, are the foster parents of many odd pets, a more famous one being the kinkajou about which Mrs. Jordan wrote in our last August issue.

Margaret Florence Doe of Miami is a student of the flora and fauna of southern Florida and is particularly interested in rare species of *Liguus*, the Florida tree snail.

R. T. Littlejohns is employed by the Department of Labor, Melbourne, Australia, and his chief hobby is capturing the strange birds of his country on his camera film.

C. L. Andrews has had an excellent background for an article on the sea otter. He has spent sixty years of his life on the west coast between California and the Arctic Ocean.

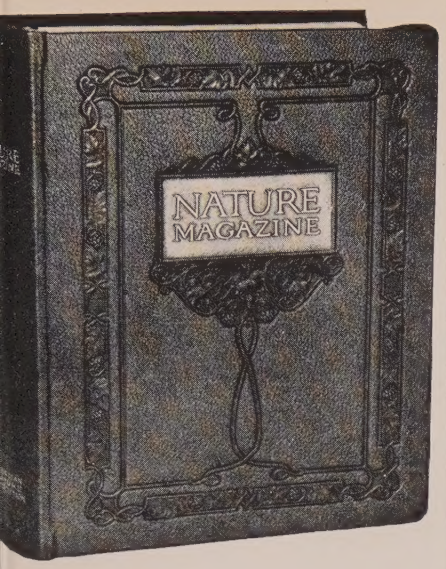
Phyllis Fairfield is a conservation-minded woman, who, as a housewife and mother, has instilled the proper attitude toward other living creatures in the minds of her children.

Invitation by Rhyme

From February 21 to 25 the Department of Superintendence of the National Education Association will hold its annual meeting in New Orleans. This is an outstanding educational gathering and will be largely attended. A special invitation to be present is transmitted to us for all members of the American Nature Association by Caroline S. Pfaff in behalf of the Orleans Parish School Board of New Orleans. The invitation says: "Come to New Orleans. Welcome awaits you here; spend with us a few days; stroll about and peer into shops and windows; into gardens rare; wander about the Vieux Carre, stroll through Jackson Square. Hear the tales the aged tell of Jean Lafitte; see on dark blue Gallatin, pirates' old retreat; ride along a bayou, or through City Park; listen to the mocking-bird that sings long after dark. Come where French is spoken; Spanish, English, too. Come and have a real good time—we're inviting you." Now if that isn't cordial, what is?

Spider Leaflet

An interesting booklet on *Spiders and Their Kin* has been prepared as Rural School Leaflet, Volume 30, Number 2, by the New York State College of Agriculture at Cornell University. The leaflet deals with spiders familiar to fields, woods and cellars and was prepared by Dr. E. Laurence Palmer, Professor of Rural Education. A table in the back gives complete information on the characteristics, range, habits and interest to man of the commoner species. Details on how to obtain this booklet for your school can be had from Dr. Palmer.



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The Conquest of the Pole

Seven expeditions into the land of everlasting ice beyond the Arctic Circle and seven heartbreaking failures to reach the point "where North, South, East and West blend into one"—the North Pole—did not stop Robert Edwin Peary from forming an eighth expedition and pushing onward towards his ultimate goal. The story of Peary's long and eventful life and his final success is told in a book simply entitled *Peary,* by William Herbert Hobbs, a man who knew Peary intimately and has included many of the great explorers of our time within his circle of friends. Admiral Peary was not only a great explorer, but also a pioneer in aviation, and the book contains an illuminating chapter on this phase of his life. One of the especially interesting features of this biography is the presentation of the Peary-Cook controversy, in which Dr. Frederick A. Cook claimed he had reached the Pole nearly a year before Peary. The author, having made a careful study of the credentials of both men, here reveals his findings. The book is priced at $5.00 and is published by the Macmillan Company, New York.

Correction

One of the illustrations for the article *What Do You Know About Honey?,* appearing in the September number, was incorrectly captioned "A honey bee at work." The bee pictured is a leaf-cutter bee. We are grateful to Mr. O. A. Stevens, associate professor of botany at North Dakota Agricultural College, for this correction.

Interesting Pictures

You and Your Camera is a photographic "what book," not a "how book." Its authors, Eleanor King and Wellmer Pessels, seek to suggest to the amateur photographer what kind of subjects make the most interesting and profitable pictures. They have left the matter of mechanics, exposures and such to the other photographic volumes. They have selected outstanding illustration, which is effectively presented, and Harper and Brothers have published the little book at $1.75.

Albino Jay?

What is thought to be a partially albino blue-fronted jay has made his appearance in Yosemite National Park, according to ranger-naturalist Edmund D. Goodwin's report to *Yosemite Nature Notes.* The bird, observed from six feet with power glasses, was described as being of a uniform "rich cream" color. However, a few of the feathers were a light shade of blue and the eyes were unchanged from the jay's normal color, indicating that the albinistic state had not been entirely attained.

Birds of Hawaii

For the subject matter of the first natural history bulletin of Hawaii National Park, the birds of the islands have been selected. This first bulletin is brought out in mimeographed form by Samuel H. Lamb, assistant park naturalist. Other bulletins will follow as the material is gathered and the need arises.

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BELL TELEPHONE SYSTEM

In February—William Bartram *By* HOWARD ZAHNISER

SOME nine years after John Bartram had begun the botanic garden that still lives as his memorial beside the Schuylkill River in Philadelphia—on February 9, 1739—the great botanist's wife bore him his son William. Thirty-eight years later, as the venerable gardener was worrying away his last days in fear that the British army would destroy his plants, the son was along the Gulf of Mexico, continuing his father's explorations and collections of plants and seeds for European patrons. On the day of John Bartram's death, September 22, 1777, William Bartram was in Mobile, where, after having made up his "collections of growing roots, seeds and curious specimens . . . to be forwarded to Dr. Fothergill of London", he was preparing to return to Augusta in Georgia "through a solitary, uninhabited wilderness."

"The attention of the traveller should be particularly turned, in the first place, to the various works of Nature." Thus William Bartram introduced his *Travels through North and South Carolina, Georgia, East and West Florida, the Cherokee Country, the Extensive Territories of the Muscogulges, or Creek Confederacy, and the Country of the Chactaws.* And with this maxim in mind he seems not only to have carried on his vast explorations between April, 1773, and January, 1778, but also to have written them down in what is today perhaps the most accessible account of an extensive natural-history survey in early America.

Certainly the outdoors person who grows restive in February waiting for the constantly promised return of spring, and then turns to books for arm-chair excursions, will find ample richness in Bartram's *Travels.* Like the author, who seems to have done little of his travelling in February, the reader can ponder then over the material Bartram collected on plants, birds, bears, "roebucks", "tygers", crocodiles, and snakes. Many accounts of America's virgin wilderness are guarded in rare-book collections, but this work has been reprinted as recently as 1928, in a series called "An American Bookshelf" published by Macy-Masius in New York.

Although called "Puc-puggy" (Flower-hunter) by the Indians, Bartram was one of the earliest of all-round naturalists, cramming this 414-page book with exciting adventures with many animals and including an annotated list of birds and mammals. Perhaps reading interest reaches one of its highest degrees as Bartram describes the crocodile "rushing forth from the flags and reeds. His enormous body swells. His plaited tail brandished high, floats upon the lake. The waters like a cataract descend from his opening jaws. Clouds of smoke issue from his dilated nostrils. The earth trembles with his thunder." A few pages further on, however, a reader's vicarious thrills may even be more breathless as Bartram, awakened by "the terrifying screams of owls in the deep swamps," finds a crocodile "monster on the top of the bank, his head towards me, not above two yards distant."

Yet Bartram, no mere thrill hunter, met all of the manifestations of Nature with an appreciative sympathy. When occasion prompted he described "towards the close of the day, the skies serene and calm, the air temperately cool, and gentle zephyrs breathing through the fragrant pines." The charm of his writings, as well as that of his attitude toward living, is in still another account of a peaceful night, when, having gathered his fire-wood and spread his skins and blankets under the protecting shade of a hospitable live oak, he "listened, undisturbed, to the divine hymns of the feathered songsters of the groves, whilst the softly whispering breezes faintly died away." Like a good traveller, though, Bartram found contentment without wishing to build tabernacles. "I was never long satisfied," he confesses, "with present possession, however endowed with every possible charm . . .; I was restless to be searching for more . . ."

Having enjoyed Bartram's travels, the February reader has still another rare enjoyment in this author. Back in his father's garden, William Bartram through a period of twenty years engaged in an activity that one interested in the temperate seasons is always resolving to undertake. He made a Nature calendar, and Witmer Stone in *The Auk* for July, 1913, has made the best of it available. Here one can refresh his hopes for spring with the reminder that in 1802 many plants were in bloom in Bartram's garden on February 2, and on the following day bees were "out of the hives seeking for flowers." On the fifteenth "peach buds swell", and on the sixteenth, with the filbert in flower, woodcock "arrived from the southard." The ground squirrels "came out of their winter quarters frisking about in the warm sun" on the seventeenth and found the alder in blossom and crow blackbirds "arrived from the southard." On the twenty-first, "a fine warm day," there were large flights of redwings and people were swimming in the Schuylkill—and then after February's best fashion it began to snow on the twenty-second "before light and continued increasing all day." Yet the next day there were "blue birds flying about", and the reader can thank the author for a month's enjoyment.

There is, in fact, much for which the modern reader can thank William Bartram. The returned traveller lived many years before death overtook him, as he rose from his father's desk where he had been describing a plant on the morning of July 22, 1823; and during these years his influence and help had encouraged younger naturalists greatly. There were many of these, but perhaps it is enough to suggest that Thomas Say, "the father of American entomology", was Bartram's grand-nephew; and Alexander Wilson, "the father of American ornithology", once wrote to Bartram: "I confess that I was always an enthusiast in my admiration of the rural scenery of nature; but since your example and encouragement have set me to attempt to imitate her productions, I see new beauties in every bird, plant, or flower I contemplate."

THE PHILOSOPHER POSES . . . .

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